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PIPERACEAE

胡椒科 hu jiao ke

Cheng Yongqian (程用谦 Tseng Yung-chien)[1], Xia Nianhe (夏念和)[1]; Michael G. Gilbert[2]

Herbs, shrubs, or climbers, rarely trees, usually aromatic. Vascular bundles ± scattered in transverse section in a monocotyledonlike manner. Tip of stem sometimes enclosed within a stipulelike sheath, the prophyll, sometimes adnate to petiole, absent in *Peperomia*. Leaves alternate, often opposite or whorled in *Peperomia*, simple, base often asymmetric, palmately or pinnately veined. Inflorescence a pedunculate spike, rarely grouped into an umbel, rarely a raceme (in *Zippelia*), leaf-opposed or axillary, rarely terminal. Flowers small, bisexual, hermaphroditic, polygamous or dioecious, nearly always sessile; bracts small, usually peltate or cupular, usually without perianth. Stamens 1–10; filaments usually free; anthers 2-locular, distinct or connate, longitudinally dehiscent. Gynoecium 2–5-carpellate, connate; ovary superior, 1-locular, ovule 1, orthotropous; stigmas 1–5, sessile or with very short styles. Fruit a small drupe or nutlet; pericarp fleshy, thin or dry, sometimes with sticky papillae (in *Peperomia*) or glochidiate spines (in *Zippelia*). Seeds with copious starchy perisperm and a minute embryo embedded in small endosperm.

About eight or nine genera and 2000–3000 species: tropical and subtropical regions, mostly in North and South America, rather fewer in Asia, a few in Africa; three genera and 68 species (36 endemic, four introduced) in China.

Tseng Yung-chien, Chen Pei-shan & Zhu Pei-zhi. 1982. Piperaceae. *In:* Tseng Yung-chien, ed., Fl. Reipubl. Popularis Sin. 20(1): 11–78.

Chinese species of economic value include *Peperomia blanda*, *P. tetraphylla* (medicines), *Piper hainanense*, *P. hancei*, *P. hongkongense*, *P. nigrum* (spice, medicine), *P. sarmentosum*, *P. wallichii*, *P. wangii*, and *P. yunnanense*.

1a. Flowers pedicellate, in lax racemes; fruit with dense, barbed spines ..... 1. *Zippelia*
1b. Flowers sessile, in dense spikes; fruit without spines.
  2a. Prophylls present, often adnate to petiole, leaving conspicuous scars around stem nodes; leaves alternate; stigmas 3–5, rarely 2 ..... 2. *Piper*
  2b. Prophylls absent, without or scars at nodes; leaves often opposite or whorled in Chinese species; stigma 1, rarely 2-cleft ..... 3. *Peperomia*

1. ZIPPELIA Blume in Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 1614. 1830.

齐头绒属 qi tou rong shu

Circaeocarpus C. Y. Wu.

Herbs erect. Stems thickened at nodes; outer vascular bundles in a ring, inner bundles scattered in 1 or 2 series. Prophylls present, caducous, forming a prominent, ringlike stipular scar at each node; main lateral veins all basal. Flowers bisexual, shortly pedicellate. Inflorescences lax, leaf-opposed racemes. Bracts ladlelike, ovate, adnate to rachis. Stamens 6; filaments free, thick, short; anthers erect, oblong, thecae introrse, parallel longitudinally dehiscent. Gynoecium 4-carpellate; ovary tuberculate; ovules 2, basal, only 1 developed; style fleshy. Fruit dry, densely glochidiate, indehiscent.

One species: tropical Asia.

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1. Zippelia begoniifolia Blume ex Schultes & J. H. Schultes in Roemer & Schultes, Syst. Veg. 7: 1651. 1830.
齐头绒 qi tou rong

Circaeocarpus sauruoides C. Y. Wu; *Piper begoniifolia* (Blume ex Schultes & J. H. Schultes) C. de Candolle; *P. lappaceum* (Bennett) C. de Candolle; *P. zippelia* C. de Candolle, 1869, nom. illeg. (included *Zippelia begoniifolia* and *Z. lappacea*); *Zippelia lappacea* Bennett.

Herbs 40–80 cm high, glabrous. Stems rooting at basal nodes, roughly striate. Petiole 2–5 cm; leaf blade ovate-oblong or ovate, 8–14 × 5–8 cm, membranous, densely pellucid dotted, base obliquely cordate, apex acuminate; veins 5–7, all basal, whitish when dry, abaxially prominent; reticulate veins conspicuous. Racemes 15–30 cm overall, flowers sparser toward apex; peduncle much longer than rachis; bracts ladlelike, ovate, 1.2–1.5 mm wide, stalk ca. as long as or slightly shorter than bract. Stamens yellowish white. Ovary greenish white, ovoid, 1–2 mm; stigmas ovate-lanceolate. Drupe globose, ca. 5 mm in diam., stalked; glochidia ca. 1.5 mm. Fl. May–Jul.

Forests, ravines; 600–700 m. S Guangxi, Hainan, S and SE Yunnan [Indonesia (Borneo, Java, Sumatra), Laos, Malaysia, Philippines, N Vietnam].

2. PIPER Linnaeus, Sp. Pl. 1: 28. 1753

胡椒属 hu jiao shu

Chavica Miquel; *Pothomorphe* Miquel.

Shrubs or climbers, rarely herbs or small trees, aromatic. Stems thickened at nodes; outer vascular bundles in a ring, inner bundles scattered in 1 or 2 series. Prophylls present, often ± connate to petiole, caducous, forming a prominent, ringlike stipular scar at each node; main lateral veins all basal or partly pinnate. Flowers mostly unisexual, dioecious, less often monoecious or bisexual, sessile. Inflorescences leaf-opposed or rarely terminal spikes, rarely spikes grouped in an apparently axillary umbel; bracts small, sometimes adnate to rachis, often peltate. Stamens 2–6, usually on rachis, rarely at base of ovary; anthers 2-loculed, 2–4-lobed. Ovary distinct or sometimes immersed in rachis; ovule 1; stigmas (2 or)3–5. Fruit a drupe, sessile or stalked, often red or yellow, obovoid, ovoid, globose, or obovoid to cuneate-obovoid and laterally compressed, rarely ellipsoid, usually glabrous.

Variously estimated to include 1000–2000 species: mainly in tropical regions; 60 species (34 endemic, three introduced) in China.

F. B. Forbes & W. B. Hemsley (J. Linn. Soc., Bot. 36: 501. 1905) included *Piper ferriei* C. de Candolle and *P. harmandii* C. de Candolle in a list of additions to the flora of China, but no specimens were listed and none has been seen from China, so these species are excluded from this account. There are probably a few more Chinese species to be identified.

The following key is based primarily on fruiting material. Male inflorescences are collected much less often than the longer-lived and often much more prominent female spikes and are completely unknown in seven species. The leaves on climbing stems are often broader than those on flowering stems, with a thinner indumentum and with a tendency to have all the main veins arising basally.

1a. Spikes on an axillary peduncle, several together in an umbel-like cluster, rarely solitary ..... 60. *P. umbellatum*
1b. Spike leaf-opposed, rarely terminal, never axillary, solitary.
2a. Leaf blade with very clearly defined, reddish brown glands, mainly along veins abaxially, uniformly dispersed adaxially ..... 26. *P. thomsonii*
2b. Leaf blade with glands colorless or apparently absent.
3a. Infructescences globose or nearly so, never more than 2 × as long as wide.
4a. Petioles and leaves very finely powdery pubescent abaxially along veins; stigmas 2 ..... 26. *P. thomsonii*
4b. Petioles and leaves glabrous; stigmas 3 or 4.
5a. Flowers bisexual; ovaries free from rachis; leaf blade 7.5–16 cm; peduncles shorter than or ca. as long as petioles ..... 4. *P. mullesua*
5b. Flowers unisexual, dioecious; ovaries and berries immersed in and connate to rachis; leaf blade 5–6 cm; peduncles ca. 4 × as long as petioles ..... 58. *P. pleiocarpum*
3b. Inflorescences cylindric, more than 3 × as long as wide (usually much more).
6a. Bracts oblong, spatulate-oblong, or obovate-oblong, adnate to rachis with only sides and apex free.
7a. Leaves pubescent at least abaxially on larger veins.
8a. Branches glabrous; leaf apex abruptly narrowed and mucronate; petiole 3–3.5 cm or longer; peduncles shorter than petioles ..... 6. *P. attenuatum*
8b. Branches densely pubescent; leaf apex acuminate; petiole 0.5–1.5 cm; peduncles longer than petioles ..... 7. *P. pingbienense*
7b. Leaves glabrous on both surfaces.
9a. Veins palmate or subpalmate, all arising less than 5 mm from base.
10a. Inflorescences 1.5–5 cm; infructescences 3–3.5 cm, rachis conspicuously pale pilose 10. *P. mutabile*

10b. Inflorescences 7–27 cm; infructescences 10–22 cm, rachis indumentum inconspicuous.
11a. Leaf base rounded to shortly cuneate; female inflorescences 7–17 cm, flowers developing unevenly; fruit smooth ..... 12. *P. interruptum*
11b. Leaf base shallowly cordate; female inflorescences 14–23 cm, flowers developing evenly; fruit minutely rugulose or granular ..... 9. *P. rhytidocarpum*
9b. Veins pinnate, with 1 or more separating from each side of midvein more than 5 mm from base.
12a. Fruit with base narrowed into 1–4 mm stalk.
13a. Leaves 5-veined, subbasal, apical pair parallel and adnate to midvein; infructescences 6–6.5 cm; fruit obovoid ..... 17. *P. mischocarpum*
13b. Leaves 7–9-veined, apical pair arising 1.5–3 cm from base of blade; infructescences 16–37 cm; fruit globose or subglobose.
14a. Peduncles longer than petioles; infructescences 29–37 cm; fruit stalks thick and strong, 1–2 mm ..... 15. *P. stipitiforme*
14b. Peduncles shorter than petioles; infructescences ca. 16 cm; fruit stalks slender, 3–4 mm 16. *P. lingshuiense*
12b. Fruit with base rounded, not narrowed into distinct stalk.
15a. Flowers polygamous, most with 2 stamens on opposite sides of ovary; infructescences dense; fruit globose, ± touching (cultivated) ..... 5. *P. nigrum*
15b. Flowers unisexual, dioecious; infructescences very lax; fruit ovoid or fusiform, usually clearly separated (wild).
16a. Leaves with 2 or more veins arising from each side of midvein above base of blade; fruit ± globose ..... 13. *P. chaudocanum*
16b. Leaves with 1 pair of veins above base of blade; fruit ovoid to fusiform.
17a. Leaf blade 4–9 cm wide; inflorescence rachis glabrous or nearly glabrous; fruit ovoid.
18a. Erect subshrubs; bracts ca. 1.5 × 0.8 mm ..... 8. *P. polysyphonum*
18b. Climbers; bracts 5.5–6 × 1–1.5 mm ..... 9. *P. rhytidocarpum*
17b. Leaf blade 3–5 cm wide; inflorescence rachis hairy; fruit fusiform.
19a. Inflorescences 1.5–5 cm; infructescences 3–3.5 cm; fruit smooth ..... 10. *P. mutabile*
19b. Inflorescences 7–15 cm; infructescences to 22 cm; fruit minutely rugulose 11. *P. hainanense*

6b. Bracts orbicular, peltate with free margin all round.
20a. Abaxial surface of leaves grayish white, with dense, sessile scales, otherwise glabrous; male inflorescences to 20 cm, grayish green ..... 49. *P. tsengianum*
20b. Abaxial surface of leaves at most pale green, often darker, without any epidermal covering except sometimes scattered, simple hairs; inflorescences shorter or, if up to 20 cm, yellow.
21a. Ovaries and fruit partly fused to rachis.
22a. Fruits apically tomentose, completely fused to each other to form a nearly smooth, fleshy, cylindric mass (often cultivated) ..... 24. *P. betle*
22b. Fruit glabrous, distinct, sometimes very soft when fully ripe and then difficult to separate when pressed and dried.
23a. Erect subshrubs; fruit tuberculate-rugulose ..... 25. *P. yunnanense*
23b. Stoloniferous herbs, vines, or scandent shrubs; fruit smooth.
24a. Stoloniferous herbs on ground, occasionally clambering over rocks; fertile branches erect; leaves very finely powdery pubescent abaxially, clearly petiolate, base never clasping, outermost veins often ± pedately divided; female spikes erect ..... 23. *P. sarmentosum*
24b. Climbers growing on trees or steep rock faces; branches often pendulous; leaves usually glabrous and with outermost veins not dividing above base (if very finely powdery pubescent, then apical leaves often nearly sessile with base cordate and clasping and female spikes reflexed) ..... 22. *P. longum*
25a. Leaves with veins all basal or nearly basal and all arising less than 3 mm from base of blade.
26a. Inflorescences bisexual; leaf blade thinly papery to membranous, base cuneate 2. *P. chinense*

26b. Inflorescences unisexual; leaf blade papery to nearly leathery, base usually cordate.
27a. Leaves densely brown pubescent, nearly tomentose, basal lobes overlapping 18. *P. submultinerve*
27b. Leaves glabrous or abaxially very finely powdery pubescent, basal lobes not overlapping.
28a. Leaves very finely powdery pubescent abaxially; apical leaves often nearly sessile, base cordate and clasping; leaves with outermost veins often ± pedately divided 22. *P. longum*
28b. Leaves glabrous; apical leaves clearly petiolate, base subcordate to ± rounded; leaves with outermost veins not dividing above base ..... 45. *P. austrosinense*
25b. Leaves with 2 or more lateral veins arising more than 1 cm from base of blade.
29a. Leaves pubescent or hispidulous, at least on veins and/or petioles.
30a. Base of leaf blade rounded to truncate; female peduncles sometimes thickened upward.
31a. Female peduncles uniform in thickness ..... 44. *P. ponesheense*
31b. Female peduncles thicker toward apex ..... 33. *P. puberulilimbum*
30b. Base of leaf blade cordate, usually deeply so; female peduncles not thickened upward.
32a. Base of leaf blade ± symmetric; female spikes ca. 3 cm in fruit; peduncles shorter than petioles, rachis glabrous ..... 19. *P. cathayanum*
32b. Base of leaf blade clearly asymmetric; female spikes 6–8 cm in fruit; peduncles longer than petioles, rachis roughly pubescent.
33a. Leaf blade abaxially conspicuously densely brown pubescent, nearly tomentose; infructescences 1–1.7 cm thick ..... 21. *P. infossum*
33b. Leaf blade abaxially hispidulous along veins to uniformly pubescent; infructescences 0.7–0.9 cm thick.
34a. Leaf blade uniformly pubescent or hispidulous at least abaxially 18. *P. submultinerve*
34b. Leaf blade hispidulous along veins only ..... 20. *P. semiimmersum*
29b. Leaf blade and petiole glabrous or very finely powdery pubescent along veins (individual hairs hardly visible through ordinary hand lens).
35a. Leaves with 4 or more lateral veins arising above base from each side of midvein (cultivated) ..... 59. *P. retrofractum*
35b. Leaves with only 2 lateral veins arising from midvein above base.
36a. Female spikes 2–5 cm at anthesis, rachis and bracts glabrous.
37a. Leaves elliptic or oblong, clearly oblique at base, one side broad and obtuse, other side narrow and cuneate ..... 46. *P. senporeiense*
37b. Leaves ovate, elliptic, or ovate-lanceolate, only slightly asymmetric at base.
38a. Male spike 2–5 cm; female spike 1.5–3 cm; leaf blade obtuse or shortly tapered at base ..... 44. *P. infossibaccatum*
38b. Male spike 5–12 cm; female spike 3–3.5 cm; leaf blade cordate at base 21. *P. infossum*
36b. Female spikes 6–10 cm at anthesis, to 30 cm in fruit, rachis and abaxial surfaces of bracts hairy.
39a. Bracts ciliate; female spikes 25–30 cm ..... 42. *P. tsangyuanense*
39b. Bracts not ciliate; female spikes 1.5–15 cm.
40a. Leaf apex rounded to subacute; bracts obovate, ca. 1.5 mm ..... 40. *P. yui*
40b. Leaf apex acute to long acuminate; bracts orbicular, ca. 1 mm.
41a. Leaf blade bullate, base shallowly cordate; apical pair of lateral veins arising 1–2(–2.7) cm from leaf base ..... 20. *P. semiimmersum*
41b. Leaf blade flat, base cuneate to rounded; apical pair of lateral veins arising 3–6 cm from leaf base ..... 47. *P. nudibaccatum*
21b. Ovaries and fruit free from rachis.

42a. Base of fruit narrowed into distinct stalk more than 1 mm; leaf base obliquely cordate, usually with overlapping ears, abaxially villous, lateral veins up to 9 on each side of midvein 14. *P. laetispicum*
42b. Base of fruit rounded to cuneate, not forming stalk; leaf not as above, lateral veins never more than 4 on one side.
43a. Rachis of inflorescence with conspicuous orange to yellow hairs visible between bracts; fruit rugulose, 3–5(–7) mm, not closely packed.
44a. Leaves papery, veins 7; stigmas 4 or 5, linear; fruit ± rounded at apex ..... 35. *P. macropodum*
44b. Leaves leathery, veins 5(–7); stigmas 3 or 4, ovate-lanceolate; fruit acute at apex 57. *P. suipigua*
43b. Rachis of inflorescence glabrous or with colorless hairs; fruit smooth or rugulose, 1.5–3 mm, often closely packed and ± angular.
45a. Leaves hairy, at least abaxially along veins (hairs clearly visible at × 6 magnification or less).
46a. Leaves abaxially densely pubescent, nearly tomentose, with most hairs obviously branched; bracts with 2–5 long hairs near apex abaxially ..... 28. *P. bonii*
46b. Leaves more sparsely hairy, most hairs unbranched, especially away from main veins; bracts glabrous abaxially.
47a. Flowers bisexual ..... 1. *P. hochiense*
47b. Flowers unisexual, dioecious.
48a. Erect subshrubs; leaves with at least 3 lateral veins arising more than 5 mm from base of midvein.
49a. Infructescences to 16 cm; leaf veins sparsely hairy, hairs ± colorless 36. *P. boehmeriifolium*
49b. Infructescences to 30 cm; leaf veins densely hairy, hairs reddish brown 37. *P. dolichostachyum*
48b. Climbers; leaves with up to 2 lateral veins arising more than 3 mm from base of midvein, otherwise all basal.
50a. Bracts 3-colored when dry: a black center (ca. 1 mm in diam.) surrounded by narrow, thickened, white band and thinner, pale yellow margin ..... 34. *P. tricolor*
50b. Bracts uniformly colored or 2-colored with narrow, pale margin when dry.
51a. Leaf base rounded to shortly tapered, if emarginate, then sinus narrower than petiole.
52a. Leaves abaxially with hairs nearly completely restricted to veins with very few between; peduncles ca. as long as petioles ..... 51. *P. kadsura*
52b. Leaves abaxially uniformly hairy, often distinctly gray; peduncles ca. 2 × as long as petioles ..... 50. *P. wallichii*
51b. Leaf base cordate (rarely leaves at apices of flowering branches not cordate), sinus much wider than petioles.
53a. Leaf base obliquely lobed, 8- or 9-veined; petiole ca. 2 mm ..... 32. *P. yinkiangense*
53b. Leaf base cordate, 5- or 7-veined; petiole ca. 10 mm or longer.
54a. Leaf blade with lateral veins all ± basal; stigma lobes 4–7 ..... 31. *P. taiwanense*
54b. Leaf blade with apical 2 lateral veins arising more than 5 mm above base; stigma lobes 3 or 4.
55a. Leaves drying yellowish to pale brown, glabrous adaxially, pubescent abaxially, hairs sparse, not regularly curved ..... 51. *P. kadsura*
55b. Leaves drying green to dark brown, roughly pubescent on both surfaces, hairs curved upward and hooklike.
56a. Leaves often with some hairs branching; male inflorescences ca. as long as leaves; bracts with stalks longer than bract width; fruit rounded at apex ..... 29. *P. hongkongense*
56b. Leaves with all hairs simple, non-branching; male inflorescences much longer than leaves; bracts with stalks shorter than bract width; fruit slightly sunken at apex ..... 30. *P. sintenense*

45b. Leaves glabrous throughout blade or very finely powdery pubescent or papillate (hairs or papillae visible at × 10 magnification or more); stems and petioles sometimes hairy.
57a. Leaves with all lateral veins arising less than 3 mm from base of blade ..... 41. *P. arborescens*
57b. Leaves with 2 or more lateral veins arising 1 cm or more from base of blade.
58a. Leaves with at least 4 lateral veins clearly arising above base of blade.
59a. Fruit ca. 4 mm in diam.; stems brown; leaves often drying gray-green ..... 48. *P. flaviflorum*
59b. Fruit 1.2–3 mm in diam.; stems and leaves usually drying blackish.
60a. Erect shrubs ..... 36. *P. boehmeriifolium*
60b. Climbers.
61a. Leaves 4–6 cm wide; bracts with stalks longer than bract width and longer than flowers, often conspicuously so ..... 38. *P. pedicellatum*
61b. Leaves 7–12 cm wide; bracts with stalks shorter than bract width and shorter than flowers ..... 39. *P. wangii*
58b. Leaves with not more than 3 lateral veins arising above base of blade.
62a. Leaves very finely powdery pubescent (magnification needed) ..... 27. *P. sylvaticum*
62b. Leaves glabrous throughout.
63a. Male spikes 8–21 cm; female or bisexual spikes 6–15 cm.
64a. Flowers bisexual; petiole 0.5–1 cm ..... 3. *P. damiaoshanense*
64b. Flowers unisexual; petiole 1–3 cm.
65a. Leaf base obliquely rounded (at least in leaves toward base of stem), apex acute to acuminate; drupe globose, apex rounded ..... 48. *P. flaviflorum*
65b. Leaf base cuneate, apex long acuminate to caudate-acuminate; berries ovoid, apex sharp-pointed ..... 57. *P. suipigua*
63b. Male spikes 1.5–10 cm; female spikes 1.5–3.5(–6.5) cm.
66a. Leaves 4- or 5-veined, apex long acuminate to caudate-acuminate.
67a. Leaves oblong or ovate-lanceolate; petiole 10–15 mm; veins curved adaxially, evidently prominent abaxially; bracts with long, pubescent stalks ..... 55. *P. rubrum*
67b. Leaves lanceolate to narrowly lanceolate; petiole 4–6 mm; veins not curved adaxially; bracts ± sessile or with short, glabrous stalks ..... 56. *P. bambusifolium*
66b. Leaves 5–7-veined, apex acute to ± abruptly acuminate.
68a. Male spikes 6–10 × ca. 0.2 cm, yellow, bracts ca. 0.8 mm in diam.; leaves 2.5–4.5 cm wide ..... 54. *P. hancei*
68b. Male or bisexual spikes 3.5–5 × 0.25–0.4 cm at anthesis, ± green or white, bracts 1–1.5 mm in diam.; leaves 3.5–8 cm wide.
69a. Leaf blade oblique at base, 7–12 cm wide.
70a. Leaf blade with apical pair of lateral veins arising (2–)3–6.5 cm above base, nearly reaching apex of leaf (Yunnan) ..... 39. *P. wangii*
70b. Leaf blade with apical pair of lateral veins arising 1–2 cm above base, alternate, reaching middle of leaf (Taiwan) ..... 53. *P. kawakamii*
69b. Leaf blade symmetric at base, 2.5–8.5 cm wide.
71a. Flowers bisexual; leaf base cuneate (mainland) ..... 2. *P. chinense*
71b. Flowers unisexual, dioecious; leaf base rounded to cordate (Taiwan).
72a. Leaf blade 6–10(–15) cm, broadly ovate to orbicular, base sometimes peltate in juvenile plants; male spikes 3.5–5 cm; female spikes 1–2.5 cm 52. *P. kwashoense*
72b. Leaf blade 9–13(–18) cm, ovate to elliptic, base never peltate; male spikes 5–8 cm; female spikes 2–3.5 cm ..... 53. *P. kawakamii*

1. Piper hochiense Y. C. Tseng, Acta Phytotax. Sin. 17(1): 24. 1979.
河池胡椒 he chi hu jiao

Climbers. Stems blackish when dry, pubescent. Petiole 7–8 mm, densely villous; leaf blade narrowly elliptic, those toward base of stem wider, bilaterally slightly unequal, black when dry, 5.5–11 × 2–3.5 cm, papery,

glandular, abaxially pubescent or with a few dichotomous hairs on midvein and veins, adaxially glabrous, base rounded, apex long acuminate; veins 7, apical pair arising 1.5–3.5 cm above base, alternate, nearly reaching leaf apex, others basal; reticulate veins abaxially conspicuous. Flowers bisexual. Spikes leaf-opposed, ca. 50 mm or longer at anthesis; peduncle ca. as long as petioles, pubescent; rachis glabrous; bracts orbicular, peltate, glabrous, or with 2 or 3 long hairs near apex; stalk ca. 0.3 mm. Stamens 2; filaments much shorter than anthers; anthers ovoid. Ovary immersed in rachis; stigmas 3, very short, caducous. Unripe drupe partly connate to rachis, globose, ca. 2 mm in diam. Fl. Jun–Jul.

• Shady cliffs; ca. 600 m. N Guangxi (Hechi Xian).

2. Piper chinense Miquel, J. Bot. (Hooker) 4: 439. 1845.

中华胡椒 zhong hua hu jiao

Climbers woody, glabrous except for rachis and bases of bracts. Petiole 1–2 cm; leaf blade ovate or broadly elliptic, 9–13 × 4–7 cm, papery, without glands, base cuneate, usually symmetric, apex shortly acuminate; veins 5(–7), apical pair arising up to 2 cm above base, reaching leaf apex, others ± basal, reticulate veins conspicuous. Flowers bisexual. Spikes leaf-opposed, 3–5 cm, slightly elongated in fruit; peduncle nearly as long as petioles; bracts orbicular, ca. 1.3 mm wide, peltate to ± clavate, distally inflexed, stalk short, densely pubescent. Stamens usually 2; filaments thick, short; anthers reniform. Ovary ovoid, distinct; stigmas 3 or 4, sessile, apex ± acute, persistent. Drupe ovoid, ca. 2 mm in diam., apex ± acute Fl. Apr–Jun.

• Thickets near villages. ?Guangdong.

This rather distinct species is known only from the type and may now be extinct. The type was not localized but is presumed to be from Guangdong.

3. Piper damiaoshanense Y. C. Tseng, Acta Phytotax. Sin. 17 (1): 25. 1979.

大苗山胡椒 da miao shan hu jiao

Climbers glabrous except for rachis. Young branches dark gray when dry, 1.5–2 mm thick, finely ridged. Prophylls 1–1.2 cm, apex rounded. Petiole 5–10 mm; leaf blade ovate-lanceolate to lanceolate, 6–11 × 1.5–3.8 cm, membranous, finely glandular, base ± rounded, slightly unequal, bilateral difference less than 2 mm, apex caudate-acuminate; veins 5(–7), apical pair arising 1.5–2 cm above base, next pair 2–3 mm above base; reticulate veins dark, ± flat. Flowers bisexual. Spikes leaf-opposed, slender, 0.8–1.3 cm × ca. 2 mm; peduncle 2–2.5 cm, 4–5 × as long as petioles; bracts orbicular, 1.2–1.5 mm wide, peltate, stalked. Stamens 2 or 3, shorter than bracts; anthers reniform, very small. Ovary globose, distinct; stigmas 3 or 4, very short. Unripe drupe black when dry, globose, ca. 2 mm in diam. Fl. Jun–Jul.

• Wet places near thickets; ca. 700 m. N Guangxi.

Type from Damiaoshan, Guangxi. *Piper chinense* is similar to *P. damiaoshanense*, but differs as follows: leaf blade broader, ovate or broadly elliptic, 4–7 cm wide, apex shortly acuminate; spikes 3–5 cm; peduncle nearly as long as petioles; bracts densely pubescent at base.

4. Piper mullesua Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 20. 1825.

短瘰 duan ju

Chavica mullesua (Buchanan-Hamilton ex D. Don) Miquel; *C. sphaerostachya* Wallich ex Miquel; *Piper brachystachyum* Wallich ex J. D. Hooker, nom. illeg. (included *P. mullesua*); *P. guigual* Buchanan-Hamilton ex D. Don.

Climbers woody, glabrous except for rachis and bases of bracts. Stems slender, hard, basal part tuberculate. Prophylls very short; petiole 0.7–2 cm, slender; leaf blade elliptic or narrowly elliptic or ovate-lanceolate, 7.5–9 × 3–4 cm, papery to thinly leathery, without glands, base cuneate, symmetric or slightly oblique, apex caudate-acuminate; veins 5(–7), abaxially very prominent, apical pair arising 1–2.5 cm above base, usually alternate; reticulate veins conspicuous. Flowers bisexual. Spikes leaf-opposed, at apices of branchlets, subglobose, ca. 3 × 2.5–3 mm; peduncle 2–3 mm; rachis pubescent; bracts orbicular, ca. 1 mm wide, peltate, abaxially glabrous; stalk short. Stamens 2; anthers reniform. Ovary obovoid; stigmas 3 or 4, very small. Drupe obovoid, ca. 2.5 mm in diam., partly immersed in rachis. Fl. May–Jul.

Forested slopes, valleys, ravines; 800–2100 m. Hainan, S Sichuan, S Xizang, Yunnan [Bhutan, India, Nepal].

The very small bisexual inflorescences are easily overlooked at anthesis. Early botanists confused male plants of other species with *Piper mullesua* and wrongly described it as having slender, filiform male inflorescences (R. Wight, Icon. Pl. Ind. Orient. t. 1931. 1853; F. A. W. Miquel, Fl. Ind. Bat. 1(2): 446. t. 27 B. 1859; C. de Candolle in A. de Candolle, Prodr. 16(1): 388. 1868; J. D. Hooker, Fl. Brit. India 5: 87. 1886). Male plants of *Piper thomsonii* are similar to *P. mullesua*, but differ as follows: vines herbaceous; petiole longer; leaf blade usually oblique, obtuse or cordate at base, very minutely hairy along veins abaxially.

Used medicinally.

5. Piper nigrum Linnaeus, Sp. Pl. 1: 28. 1753.

胡椒 hu jiao

Climbers woody. Nodes clearly enlarged and rooting, glabrous. Petiole 1–2 cm, glabrous; leaf blade ovate to ovate-oblong, rarely suborbicular, 10–15 × 5–9 cm, thick, ± leathery, glabrous, base rounded, usually slightly oblique, apex acute; veins 5–7(–9), apical pair arising 1.5–3.5 cm above base, alternate, others basal; reticulate veins prominent. Flowers polygamous, usually monoecious. Spikes leaf-opposed, to as long as leaves; peduncle nearly as long as petioles, glabrous; bracts spatulate-oblong, 3–3.5 × ca. 0.8 mm, adaxially adnate to rachis, only margin and broad, rounded apex free, shallowly cupular. Stamens 2, 1 on each side of ovary; filaments thick, short; anthers reniform. Ovary globose; stigmas 3 or 4, rarely 5. Drupe red when ripe, drying black when unripe, globose, 3–4 mm in diam., sessile. Fl. Jun–Oct.

Widely cultivated, often in forest clearings. Fujian, Guangdong, Guangxi, Yunnan [native to SE Asia].
The source of black and white pepper.

6. Piper attenuatum Buchanan-Hamilton ex Miquel, Syst. Piperac. 306. 1843.

卵叶胡椒 luan ye hu jiao

Climbers. Stems obviously ridged and furrowed when dry, glabrous. Petiole 3–3.5 cm, shortest on leaves toward apex of stem, sparsely hispidulous; prophyll 3–7 mm; leaf blade ovate-orbicular or ovate, 8–11 × 5–8 cm, membranous, glandular, abaxially sparsely hispidulous, especially on veins, adaxially glabrous, base rounded to subcordate, usually truncate, rarely shortly tapered on apical leaves, symmetric or slightly oblique, apex cuspidate or mucronate; veins 7(–9), apical pair arising 0–5 mm above base, reaching leaf apex, others basal. Flowers monoecious. Spikes leaf-opposed. Male spikes 8–14 cm, slender; bracts oblong-obovate, apex rounded, ca. 2 × 0.6–1 mm, adnate to rachis, margin free, apex ± rounded. Stamens 2–4; filaments nearly as short as anthers; anthers ovoid. Female spikes 7–9 cm, to 18 cm in fruit; peduncle 5–8 mm; rachis sparsely hairy around ovaries; bracts shallowly cupular, ca. 3 × 1 mm, to 4 mm in fruit, glabrous. Ovary ovoid, distinct; stigmas 4 or 5, linear. Drupe drying black, ovoid to globose, ca. 3.5 mm in diam. Fl. Oct–Dec.

Wet places within forests. W Yunnan [Bhutan, India].
Some recent authors have combined this species with *Piper bantamense* Blume, from Indonesia (Java). However, that species differs from *P. attenuatum* as follows: petiols shorter, 1–1.8 cm, sheath more than 2/3 as long as petiole; leaf blade usually elliptic, sometimes ovate, 5–7-veined, apical pair of veins usually arising ca. 1 cm above base, base obtuse or broadly cuneate, apex acute to acuminate; peduncle about as long as or longer than petiole.

7. Piper pingbienense Y. C. Tseng, Acta Phytotax. Sin. 17(1): 26. 1979.

屏边胡椒 ping bian hu jiao

Climbers dioecious. Stems prominently striated, with rather dense, thick hairs. Petiole 0.5–1.5 cm, densely pubescent; leaf blade ovate or long ovate, 7.5–13 × 4–8 cm, papery, abaxially sparsely appressed pubescent, adaxially pubescent along veins, especially at base, base rounded, symmetric or nearly so, apex shortly acuminate and obtuse; veins 7, apical pair arising 0.5–1.5 cm above base, others basal; reticulate veins prominent, finely glandular. Spikes leaf-opposed. Male spikes 7–14 cm, pendulous; peduncle slightly longer than petioles; bracts obovate, adnate to rachis. Stamens 2. Female spikes slightly longer than opposing leaf; peduncle longer than petioles, pubescent; rachis densely pubescent; bracts suboblong, base slightly tapered, adnate to rachis, 1.5–2 × ca. 1 mm, margin free. Ovary ovoid, distinct; stigmas 4 or 5, lanceolate. Unripe drupe ovoid, ca. 4 × 3 mm, Fl. May–Aug.

• Forests, on trees or rocks; 1100–1300 m. SE Yunnan (Xichou Xian, Maguan Xian, Pingbian Miaozu Zizhixian).
The Indian species *Piper hookeri* Miquel is closely related.

8. Piper polysyphonum C. de Candolle, Bull. Herb. Boissier, sér. 2, 4: 1026. 1904.

樟叶胡椒 zhang ye hu jiao

Piper mekongense C. de Candolle.

Subshrubs erect, to more than 1 m high, glabrous except for a few hairs at bases of flowers, dioecious. Stems black when dry; nodes prominent. Petiole ca. 1 cm; prophyll ca. 2/3 as long as petiole; leaf blade elliptic or broadly elliptic, 11–19 × 4–9 cm, papery, glandular, often ± reddish adaxially when dry, base shortly tapered or subcuneate, rarely rounded, usually symmetric, apex shortly acuminate and mucronate; veins 5–7, apical pair arising 2.5–5 cm above base, alternate, reaching leaf apex, others ± basal; reticulate veins prominent, transversely oblong. Spikes leaf-opposed. Male spikes 7–9 cm × ca. 2 mm; peduncle slightly longer than petioles; bracts obovate-oblong, ca. 1.8 × 0.7 mm, adnate to rachis, margin and apex free. Stamens 3; filaments ca. as long as anthers, sometimes much longer; anthers ovoid. Female spikes 7–11 cm, to 17 cm in fruit; peduncle and rachis as in male spikes; bracts oblong, 3.5–4 × 1.1–1.3 mm. Ovary ovoid, distinct; stigmas 3 or 4, ovate, apex acuminate. Drupe drying black, ovoid, 3–3.5 mm in diam., tuberculate, apex ± subacute, sessile. Fl. Apr–Jun.

Wet places within forests; 800–1400 m. SW Guizhou, S Yunnan [Laos].

9. Piper rhytidocarpum J. D. Hooker, Fl. Brit. India 5: 92. 1886.

皱果胡椒 zhou guo hu jiao

Piper madidum Y. C. Tseng; *Piper nigrum* Linnaeus var. *macrostachyum* C. de Candolle.

Climbers glabrous, dioecious. Stems terete, 2–4 mm thick, striolate; internodes (6–)10–13 cm. Leaves toward base of stem: petiole ca. 2.5 cm, prophyll ca. 7/8 as long as petiole; leaf blade broadly ovate, ca. 9.5 × 8 cm, papery, base shallowly cordate, ± symmetric, apex acute-acuminate; veins 7, all basal; leaves toward apex of stem (on flowering stems): petiole 1.5–2.5 cm, prophyll 1.3–2.2 cm; leaf blade ovate or narrowly ovate, 10–14 × 5–6.5 cm, base ± rounded, slightly oblique; veins 7, apical 2 arising 0.5–2.5 cm above base, arcuate-ascending ± to apex; reticulate veins conspicuous. Spikes leaf-opposed. Male spike pendulous, white, to 13 cm × ca. 1 mm; peduncle 0.8–1.5 cm, spreading; bracts oblong, ca. 1.5 × 0.5 mm, adnate to rachis. Stamens 2; filaments much longer than anthers. Female spikes 14–30 cm × ca. 1 mm; peduncle 1.5–2.2 cm; rachis glabrous; bracts oblong, base slightly narrowed, fused to rachis, sides and apex free, 5.5–6 × 1.5–2 mm; stigmas 3 or 4, persistent, reflexed. Unripe drupe ovoid, 3–4 mm in diam., minutely rugulose or granular when dry.

600–900 m. Xizang (Mêdog Xian) [Bangladesh, NE India].

10. Piper mutabile C. de Candolle in Lecomte, Fl. Indo-Chine 5: 92. 1910.

变叶胡椒 bian ye hu jiao

Climbers glabrous except for rachis, dioecious. Stems slender, finely ridged. Petiole 5–12 mm; leaf blades toward base of stem ovate to narrowly elliptic, 5–6 × 4.5–5 cm, thinly papery, base cordate, usually symmetric, apex acute to acuminate; veins 5(–7), apical pair arising 0–6 mm above base, reaching leaf apex, others basal; reticulate veins abaxially ± prominent, glandular; leaf blades toward apex of stem 5–9 × 2–3.5 cm, base rounded or cuneate. Spikes leaf-opposed, yellow. Male spikes 3–5 cm × ca. 2 mm; peduncle 1–2 cm, slender; rachis pilose, hairs very pale pinkish brown; bracts ovate-oblong, 2–2.2 × ca. 1 mm, adnate to rachis, margin free. Stamens 2 or 3; anthers subglobose. Female spikes 1.5–2.5 cm, 3–3.5 cm in fruit; peduncle as in male spikes; rachis villous; bracts sometimes slightly shorter than in male spikes. Ovary distinct; stigmas 3 or 4, linear. Drupe ellipsoid-globose, 4–6 × 3–4 mm, smooth, base slightly shrunken. Fl. Jun–Aug.

Slopes, in thickets along streams; 400–600 m. Guangdong, Guangxi [N Vietnam].

Named for the variability of the leaves, although this is not so marked in the Chinese material.

11. Piper hainanense Hemsley in F. B. Forbes & Hemsley, J. Linn. Soc., Bot. 26: 365. 1891.

海南瘰 hai nan ju

Piper flagelliforme Yamamoto.

Climbers woody, glabrous except for rachis, dioecious. Stems 2–4 mm thick, finely furrowed. Petiole 1–3.5 cm; leaf blade ovate-lanceolate or elliptic, 7–12 × 3–5 cm, thinly leathery, drying gray-green, abaxially glaucous, adaxially shiny, base rounded or broadly cuneate, inconspicuously cordate, sinus usually narrower than petiole, apex usually acuminate, occasionally ± acute; veins 5(–7), apical pair arising up to 1 cm above base, others ± basal. Spikes leaf-opposed. Male spikes 7–12 cm × ca. 1.5 cm or longer; peduncle 1–2 cm; bracts obovate to obovate-oblong, ca. 1.5 × 0.8 mm, peltate, glandular. Stamens 3 or 4; filaments short. Female spikes 8–15 cm, to 22 cm in fruit; peduncle as in male spikes; rachis pubescent; bracts oblong or ovate-oblong, adnate to rachis, 2–3.5 × 0.8–1 mm, margin free. Ovary obovoid, sessile; stigmas 4, lanceolate, reflexed, persistent. Drupe ± fusiform, ca. 4–5 × 2.7–3.5 mm, minutely tuberculate to rugulose. Fl. Mar–May.

• Forests, on rocks or trees; 100–900 m. S Guangdong, S to SW Guangxi, Hainan.

12. Piper interruptum Opiz in Presl, Rel. Haenk. 1: 157. 1828.

疏果胡椒 shu guo hu jiao

Piper interruptum var. *multinervum* C. de Candolle.

Climbers dioecious. Stems 2–4.5 mm thick, ridged, glabrous. Petiole 1–2.5(–4) cm, glabrous, sheathed at base only; leaf blade ovate to long ovate, 6–13 × 4–7 cm, ± membranous or papery, without evident glands, both surfaces glabrous, base rounded or shortly tapered, ± symmetric, apex acute or shortly acuminate; veins 5(–7), all basal; reticulate veins abaxially prominent, lax. Spikes leaf-opposed. Male spikes 11–27 cm × 1.5–3 mm; peduncle ca. as long as petioles, glabrous; bracts oblong, 3–4 × ca. 1 mm, adnate to rachis, margin free, apex ± rounded. Stamens 2(or 3). Female spikes 7–17 cm, flowers unevenly developed, sparse or interrupted in fruit; peduncle nearly as long as opposite leaves, glabrous; rachis and bracts as in male spikes. Ovary distinct, ovoid, apex acute; stigmas 4 or 5. Drupe ovoid or ovoid-globose, 3–6 × 2–4 mm, smooth. Fl. May–Jun.

Forests. Taiwan [Indonesia, Philippines; Pacific Islands ?]
No Chinese material has been seen by the authors.

13. Piper chaudocanum C. de Candolle, Annuaire Conserv. Jard. Bot. Genève 2: 274. 1898.

勐海胡椒 meng hai hu jiao

Climbers glabrous except for rachis, dioecious. Stems ± gray when dry, ca. 2 mm thick, ridged. Petiole 1–1.2 cm; prophyll to as long as petiole; leaf blade oblong to ovate-lanceolate, 10.5–13(–16) × 3–5 cm, papery, finely glandular, slightly bullate when old, abaxially pale gray, base obtuse to tapered, ± symmetric to slightly oblique, bilateral difference 0–2 mm, apex acuminate and mucronate; veins pinnate, 3 per side, alternate, slender, apical pair arising 4–5.5 cm above base; reticulate veins prominent. Spikes leaf-opposed. Male spikes 8–9 cm × ca. 2 mm; peduncle 2.5–3 cm; bracts oblong, ca. 1.2 × 0.5 mm, adnate to rachis, margin and apex free. Stamens 3, exserted; filaments longer and thicker than anthers; anthers ovoid. Female spikes to 15 cm in fruit; rachis and bracts as in male spikes. Drupe subglobose, ca. 3 mm in diam. (not fully mature), sessile. Fl. Mar.

Climbing on trees. S Yunnan (Menghai Xian) [Laos, S Vietnam].

The name was first given as *"Piper chandocanum,"* but the epithet is based on "Mont. de Chaudoc" so *"chandocanum"* must be treated as an orthographic error. The presumed holotype of this species has the inflorescence rachis glabrous, albeit partly covered with fungal hyphae. The specimen from Menghai, Yunnan, has the rachis pubescent.

14. Piper laetispicum C. de Candolle, Notul. Syst. (Paris) 3: 42. 1914.

大叶瘰 da ye ju

Piper maclurei Merrill.

Climbers woody, to 10 m tall, dioecious. Stems drying pale brown, 2–3 mm thick, ridged, glabrous. Petiole 2–5 mm on wider side, pubescent; prophyll 2–3 mm; leaf blade oblong to ovate-oblong, rarely elliptic, (9–)12–17 × (2.7–)4–9 cm, leathery, pellucid dotted, abaxially sparsely villous, adaxially glabrous, base obliquely cordate, basal lobes usually overlapping, bilateral difference 4–5 mm, apex shortly acuminate; veins pinnate, ca. 9 per side, apical pair arising 5–8 cm above

base, next pair thickest, usually 1–1.5 cm above base, reaching middle of leaf blade, looped, others conspicuous, ± basal; reticulate veins prominent. Spikes leaf-opposed. Male spikes ca. 10 cm × 4 mm; peduncle 1–1.5 cm, glabrous; rachis pubescent; bracts broadly obovate, ca. 1.3 × 1 mm, peltate, ciliate. Stamens 2; filaments thick, ca. 1.2 mm. Female spikes ca. 10 cm at anthesis, to 15 × 1.5–2.2 cm in fruit; rachis, densely rough pubescent; bracts obovate-oblong, adnate to rachis. ca. 2 × 1.1 mm, margin free, ciliate. Ovary ovoid; stigmas 4, apex acute. Drupe subglobose, ca. 5 mm in diam., base tapered into a stalk ca. as long as fruit. Fl. Aug–Dec.

• Forests, on trees or rocks; 100–600 m. S Guangdong, Hainan.

Piper laetispicum is closely related to *P. politifolium* C. de Candolle, from Vietnam, and may have to be included within that species. The name *"P. latispicum"* C. de Candolle (Candollea 1: 230. 1923) is apparently an orthographic error for this species.

15. Piper stipitiforme C. C. Chang ex Y. C. Tseng, Acta Phytotax. Sin. 17(1): 28. 1979.

短柄胡椒 duan bing hu jiao

Climbers woody, glabrous except for rachis, dioecious. Stems black when dry, 2–3 mm thick, finely ridged. Petiole 1–2.2 cm; prophyll ca. 1/4 as long as petioles or longer; leaf blade elliptic, 9–13 × 4.5–7 cm, papery, finely glandular, base rounded, ± symmetric, apex acute and mucronate; veins 7, apical pair arising 1.5–3 cm above base, reaching leaf apex, others basal; reticulate veins prominent. Spikes leaf-opposed. Male inflorescences unknown. Female spikes 29–37 cm in fruit; peduncle slightly longer than petioles; bracts oblong, adnate to rachis, ca. 4–7 × 1.3–1.8 mm, base slightly tapered. Stigmas 3 or 4, lanceolate. Drupe globose, ca. 3 mm in diam., base tapered into short, thick stalk 1–2 mm. Fl. Oct–Jan.

• Valley forests, on trees; 800–1300 m. SW Yunnan.

16. Piper lingshuiense Y. C. Tseng, Acta Phytotax. Sin. 17(1): 28. 1979.

陵水胡椒 ling shui hu jiao

Climbers woody, glabrous except for rachis, dioecious. Stems 2–3 mm thick, ridged. Petiole 1–1.5 cm; prophyll 2–3 mm; leaf blade ovate to suborbicular, rarely broadly elliptic, 10–17 × 5.5–9 cm, thin leathery, without glands, base obtuse or slightly tapered, ± symmetric, apex acute; veins 7(–9), apical pair arising 1.5–3 cm above base, reaching leaf apex, others basal; reticulate veins prominent. Spikes leaf-opposed. Male spikes ca. 9 cm × 1.2 mm; peduncle shorter than petioles; rachis pubescent; bracts obovate-oblong, ca. 1.4 × 0.6 mm, adnate to rachis, sides free, peltate. Stamens 3; filaments thick, short. Female spikes 7–10 cm, to 16 cm in fruit; peduncle and rachis as in male spikes; bracts oblong, ca. 3.2 × 1.3 mm, base slightly tapered, otherwise as in male spikes. Drupe globose, ca. 5 mm in diam., base tapered into a stalk 3–4 mm. Fl. Oct–Jan.

• Forests, on trees; ca. 800 m. Hainan.

17. Piper mischocarpum Y. C. Tseng, Acta Phytotax. Sin. 17 (1): 29. 1979.

柄果胡椒 bing guo hu jiao

Climbers glabrous except for rachis, dioecious. Stems black when dry, slender, finely striated, tuberculate. Petiole 5–10 mm; leaf blade elliptic, rarely ovate, 4–6 × 2–2.5 cm, papery, drying black, densely glandular, base shortly tapered, sometimes rounded, ± symmetric, apex acute; veins 5, apical pair arising ca. 5 mm above base, reaching leaf apex, others basal; reticulate veins inconspicuous. Spikes leaf-opposed. Male spike not seen. Female spikes 6–6.5 cm in fruit; peduncle 1–1.2 cm; rachis pubescent; bracts oblong, adnate to rachis, ca. 2 × 0.8 mm, margin and apex free. Ovary ovoid, distinct; stigmas 3, linear, reflexed. Drupe obovoid, 4–5 × ca. 3 mm, base tapered into a thick stalk ca. 2 mm. Fr. Oct.

• Wet forests in ravines, on trees; ca. 500 m. S Yunnan.

18. Piper submultinerve C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 480. 1917.

多脉胡椒 duo mai hu jiao

Climbers 3–12 m long, dioecious. Stems thickly ridged, densely hispidulous. Petiole 1.5–3.5 cm, densely hispid-pubescent, nearly tomentose; leaf blade ovate to ovate-lanceolate or oblong, 9–20 × 2.5–11 cm, papery, densely glandular, abaxially hispidulous, adaxially pubescent along veins, especially near base, base deeply cordate, basal lobes sometimes partly overlapping and unequal, bilateral difference to 1.5 mm, apex acute to slightly acuminate; veins 7 or 9, apical pair arising up to 1 cm above base, others ± basal; reticulate veins conspicuous, abaxially slightly prominent. Spikes leaf-opposed. Male spike not seen. Female spikes 3–4 cm when young, to 6–8 × ca. 0.9 cm in fruit; peduncle longer than opposing petioles, hispidulous; rachis roughly pubescent; bracts orbicular, ± sessile, peltate, ca. 1 mm in diam., glabrous abaxially. Stigmas 4 or 5, recurved, linear, apex acute. Drupe globose, ca. 3 mm in diam., partly connate to rachis. Fl. Apr–Jun.

• Forests, on trees and rocks in shady and wet places; 1400–2500 m. NW and W Guangxi, S and SE Yunnan.

1a. Leaf blades ovate, rarely ± lanceolate, 13–20 × 6–11 cm, evidently 9-veined 18a. var. *submultinerve*

1b. Leaf blades ovate-lanceolate to oblong, 9–14 × 2.5–4 cm, usually 7-veined 18b. var. *nandanicum*

18a. Piper submultinerve var. **submultinerve**

多脉胡椒(原变种) duo mai hu jiao (yuan bian zhong)

Leaf blade ovate, rarely ± lanceolate, 13–20 × 6–11 cm; veins evidently 9. Fl. May–Jun.

• Forests, on trees and rocks in shady and wet places; 1400–1800 m. S and SE Yunnan.

18b. Piper submultinerve var. **nandanicum** Y. C. Tseng, Acta Phytotax. Sin. 17(1): 31. 1979.

狭叶多脉胡椒 xia ye duo mai hu jiao
Leaf blade ovate-lanceolate to oblong, 9–14 × 2.5–4 cm; veins usually 7. Fl. Apr–May.

• Valley forests, on trees and rocks; ca. 2500 m. NW and W Guangxi.

19. Piper cathayanum M. G. Gilbert & N. H. Xia, Novon 9: 191. 1999.
华山蒌 hua shan lou
Chavica sinensis (Champion) Bentham, J. Bot. (Hooker) 6: 116. 1854; *Piper sinense* (Champion ex Bentham) C. de Candolle (1868), not *P. chinense* Miquel (1845).
Climbers to more than 5 m, dioecious. Young stems densely softly pubescent, glabrescent. Petiole 1–1.5 cm, densely pubescent; leaf blade ovate, ovate-oblong, or oblong, 8–15 × 3.5–6.5 cm, papery, abaxially pubescent, especially along veins, adaxially glabrous or sparsely pubescent at base, base deeply cordate, basal lobes often overlapping, ± symmetric, apex obtuse or acute; veins 7, usually opposite, apical pair arising 5–1 mm above base; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 2.5–4 cm × 4–5 mm; peduncle shorter than petioles, roughly pubescent; rachis glabrous; bracts orbicular, ca. 1.2 mm wide, peltate, glabrous, ± sessile. Stamens 2. Female spikes to 3 cm in fruit; rachis and bracts as in male spikes. Stigmas usually 3. Drupe globose, ca. 2.5 mm in diam., partly connate to rachis. Fl. Mar–Jun.

• Forests, along streams, on trees; ca. 400 m. S to SW Guangdong, Guangxi, SE Guizhou, Hainan, Sichuan (Emei Xian).
This species is much better known as *Piper sinense* but unfortunately that name must be treated as a later homonym of *P. chinense* (ICBN, Art. 53.3), so a new name has had to be given.

20. Piper semiimmersum C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 479. 1917.
缘毛胡椒 yuan mao hu jiao
Climbers dioecious. Stems pale brownish when dry, thickly furrowed, usually densely hispid, less often glabrous. Petiole 0.8–1.3 cm, sparsely long pubescent; leaf blade oblong-ovate or ovate-lanceolate, rarely those toward apex of stem oblong, 11–18 × 2.5–7.5 cm, papery, often ± bullate when older, finely glandular, usually abaxially hispidulous along veins, adaxially glabrous or rarely sparsely pubescent at base, base obliquely cordate, basal lobes divergent or overlapping, bilateral difference 2–3 mm, apex shortly acuminate; veins 7, apical pair arising 1–2(–2.7) cm above base, usually alternate, reaching leaf apex, others basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 7–8 cm × ca. 2.5 mm; peduncle 2–2.5 cm, sparsely pubescent; bracts suborbicular, ca. 1.2 mm wide, peltate, margin pale brown, abaxially finely papillate pubescent, densely ciliate, ± sessile, base slightly tapered. Stamens usually 2; anthers reniform, very short. Female spikes 6–7 cm × 7–8 mm in fruit; peduncle 3–4 cm; rachis roughly pubescent; bracts as in male spikes but compressed and partly revolute, falcate or 3-pointed. Ovary partly immersed in rachis; stigmas 3 or 4, linear, small. Drupe globose, ca. 3 mm in diam., apex umbonate. Fl. Jan–May.
Wet places of valley forests, near villages; 200–900 m. W Guangxi, SW Guizhou, SE to SW Yunnan [N Vietnam].

21. Piper infossum Y. C. Tseng, Acta Phytotax. Sin. 24: 383. 1986.
沉果胡椒 chen guo hu jiao
Climbers dioecious. Stems terete, 2–4 mm thick, coarsely striate. Leaves toward base of stem: petiole ca. 0.8–1.3 cm, tomentose, prophyll up to 1/2 as long as petiole; leaf blade ovate or narrowly ovate, 10–18 × 5–10 cm, papery, glabrous to abaxially tomentose, adaxially pilose along veins, base cordate, oblique, apex acute or acute-acuminate; veins 9, apical pair arising 1–3 cm above base, others basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 5.6–7.5 cm × 3–4 mm; peduncle 2.5–3 cm, long villous; rachis white villous; bracts orbicular or nearly so, ca. 1.5 mm wide, peltate, subsessile. Stamens 2; filaments very short. Female spikes ca. 1 cm × 2 cm; peduncle 1.5–2 cm, usually pubescent; rachis and bracts as in male spikes. Ovary partly immersed in rachis; stigmas 3 or 4, small. Unripe drupes few, globose, 3–3.2 mm in diam.
• 700–900 m. Xizang.

1a. Plants ± hairy throughout, usually densely so ..... 21a. var. *infossum*
1b. Plants glabrous except for rachis and bract margins ..... 21b. var. *nudum*

21a. Piper infossum var. **infossum**
沉果胡椒(原变种) chen guo hu jiao (yuan bian zhong)
Plants ± hairy throughout. Leaf blade ovate or ovate-lanceolate.
• 700–900 m. Xizang (Mêdog Xian).

21b. Piper infossum var. **nudum** Y. C. Tseng, Acta Phytotax. Sin. 24: 385, fig. 2, 8–10. 1986.
落叶沉果胡椒 luo ye chen guo hu jiao
Plants glabrous except for rachis and bract margins. Leaf blade elliptic or ovate-lanceolate.
• Xizang (Mêdog Xian).

22. Piper longum Linnaeus, Sp. Pl. 1: 29. 1753.
荜拨 bi ba
Chavica roxburghii Miquel.
Climbers to several m long, dioecious; many parts very finely powdery pubescent when young. Stems often flexuous. Petiole 0–9 cm, leaves toward base of stem long petiolate, those at apex of stem sometimes nearly sessile and clasping, very finely powdery pubescent; prophyll ca. 1/3 as long as petiole; leaf blades toward base of stem ovate to ± reniform, those at apex of stem ovate to ovate-oblong, 6–12 × 3–12 cm, papery, densely glandular, base cordate, basal lobes rounded and equal, slightly incurved, leaf blades toward apex of stem sometimes with basal lobes overlapping, slightly

unequal, apex acute to acuminate; veins 7, apical pair partly closely parallel to midvein, reaching leaf apex, others basal; reticulate veins lax. Spikes leaf-opposed, recurved. Male spikes 4–5 cm × ca. 3 mm; peduncle 2–3 cm; bracts suborbicular, sometimes slightly cuneate, ca. 1.5 mm wide, peltate, glabrous, stalk short. Stamens 2; filaments very short; anthers ellipsoid. Female spikes (1–) 1.5–2.5 cm × 2.5–4 mm, 2–3 cm in fruit; peduncle and rachis as in male spikes; bracts 0.9–1 mm in diam. Ovary ovoid, partly connate to rachis; stigmas 3, ovoid, apex acute. Drupe globose, ca. 2 mm in diam., apex umbonate, partly connate to rachis. Fl. Jul–Oct.

Forests; ca. 600 m. SE to SW Yunnan; cultivated in Fujian, Guangdong, Guangxi, Hainan [India, Malaysia, Nepal, Sri Lanka, Vietnam].

Used medicinally.

23. Piper sarmentosum Roxburgh, Fl. Ind. 1: 162. 1820.

假瘰 jia ju

Chavica hainana C. de Candolle; *C. sarmentosa* (Roxburgh) Miquel; *Piper albispicum* C. de Candolle; *P. brevicaule* C. de Candolle; *P. gymnostachyum* C. de Candolle; *P. lolot* C. de Candolle; *P. pierrei* C. de Candolle; *P. saigonense* C. de Candolle.

Herbs to more than 10 m, mostly creeping along ground, most parts very finely powdery pubescent at least when young, dioecious. Fertile stems ± erect. Petiole 2–5 cm (–10 cm on creeping stems), very finely powdery pubescent; leaf blades toward base of stem ovate to suborbicular, those toward apex of stem smaller, ovate or ovate-lanceolate, 7–14 × 6–13 cm, ± membranous, finely glandular, abaxially finely powdery pubescent along veins, adaxially glabrous, base cordate to rounded, sometimes cuneate on apical branches, ± symmetric, apex acute; veins 7, glaucous when dry, abaxially very prominent, apical pair arising 1–2 cm above base, reaching leaf apex; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes white, 1.5–2.5(–3) cm × 2–3 mm; peduncle to ca. as long as spikes; rachis pubescent; bracts transversely elliptic, 0.5–0.6 mm, peltate, ± sessile. Stamens 2; filaments ca. 2 × as long as anthers; anthers subglobose. Female spikes 2–5(–8) cm, to 8 mm thick in fruit; peduncle as in male spikes; rachis glabrous; bracts suborbicular, peltate, 1–1.3 mm in diam. Stigmas (3 or)4(or 5), hispidulous. Drupe subglobose, 4-angled, 2.5–3 mm, partly connate to rachis. Fl. Apr–Nov.

Forests or wet places near villages; near sea level to 1000 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Xizang, Yunnan [Cambodia, India, Indonesia, Laos, Malaysia, Philippines, Vietnam].

Used as medicine traditionally.

24. Piper betle Linnaeus, Sp. Pl. 1: 28. 1753.

蒌叶 lou ye

Climbers dioecious. Stems rooted at nodes, 2.5–5 mm thick, slightly woody. Petiole 2–5 cm, very finely powdery pubescent; prophylls ca. 1/3 as long as petioles; leaf blade ovate to ovate-oblong, those at apex of stem sometimes elliptic, 7–15 × 5–11 cm, papery to ± leathery, abaxially densely glandular with very finely powdery pubescent veins, adaxially glabrous, base cordate, sometimes rounded in leaf blades toward apex of stem, symmetric or nearly so, apex acuminate; veins 7, apical pair arising 0.7–2 cm above base, usually opposite, others basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes nearly as long as leaf blades at anthesis; peduncle nearly as long as petioles; rachis pubescent; bracts orbicular or suborbicular, rarely obovate, 1–1.3 mm wide, peltate, ± sessile. Stamens 2; filaments thick, ca. as long as anthers or longer; anthers reniform. Female spikes 3–5 × ca. 1 cm, longer in fruit; rachis fleshy, densely pubescent. Ovary partly immersed in and connate to rachis, apex tomentose; stigmas usually 4 or 5, lanceolate, tomentose. Drupes fused to form terete, fleshy, reddish, compound fruit, apices tomentose, prominent. Fl. May–Jul.

Cultivated. SE to SW China [India, Indonesia, Malaysia, Philippines, Sri Lanka, Vietnam; Africa (Madagascar)].

Widely cultivated, of uncertain origin, and used for medicinal, spice, and aromatic purposes.

25. Piper yunnanense Y. C. Tseng, Acta Phytotax. Sin. 17(1): 32. 1979.

瘰子 ju zi

Subshrubs erect, 1–3 m high, dioecious. Stems finely ridged, pubescent. Petiole 0.8–1.4 cm, pubescent, sheathed at base only; leaf blade usually ovate, those at apex of stem elliptic, 10–15 × 6–10 cm, thinly papery, abaxially densely glandular with hispidulous veins, adaxially glabrous, base obliquely cordate, usually oblique in leaf blades toward apex of stem, apex acute; veins 9, apical pair arising 1.2–3 cm above base, alternate, others basal; reticulate veins conspicuous Spikes leaf-opposed. Male spikes 4–6 cm; peduncle slightly longer than petioles, pubescent; bracts orbicular, ca. 1.1 mm wide, peltate, stalk short. Stamens 3; filaments thick, much shorter than anthers; anthers ovoid. Female spikes 4–8 cm, 4–6 mm thick in fruit; bracts 0.8–1 mm in diam. Ovary partly immersed in rachis; stigmas 3, caducous. Drupe red when ripe, globose, ca. 2 mm in diam., tuberculate, partly connate to rachis. Fl. Apr–Jun.

- Forests or wet places; 1100–2000 m. NW, S, and SW Yunnan.

Used medicinally.

26. Piper thomsonii (C. de Candolle) J. D. Hooker, Fl. Brit. India 5: 87. 1886.

球穗胡椒 qiu sui hu jiao

Chavica thomsonii C. de Candolle in A. de Candolle, Prodr. 16(1): 389. 1868.

Climbers herbaceous, 1–2 m long, glabrous or very finely powdery puberulent, dioecious. Stems 3–4 mm thick, finely ridged when dry, glabrous. Petiole 1–2.5 cm, glabrous to very finely pubescent; prophylls ca. 1/2 as long as petioles; leaf blade ovate, ovate-lanceolate,

or elliptic, 6–16 × 3–8 cm, membranous to thinly papery, drying pale green abaxially, abaxially densely brownish red glandular especially along veins, very finely powdery pubescent along veins especially abaxially, glabrescent, base rounded, or shallowly cordate, occasionally broadly cuneate, often oblique, apex acuminate to long acuminate; veins 5–7, apical pair arising 0.5–5 cm above base, next pair sometimes also arising above base; reticulate veins conspicuous Spikes leaf-opposed. Male spikes 3–5.5 cm × 1.7–2 mm, ± white; peduncle to 8 mm; bracts orbicular, 0.8–1 mm wide, peltate, abaxially brownish red glandular, adaxially pubescent, ± sessile. Stamens (2–)4; filaments slender, short; anthers reniform. Female spikes cylindric to globose, to 1.5 cm, 0.6–2 cm × 6–8 mm in fruit; peduncle 4–10 mm; bracts as in male spikes. Ovary globose, distinct; stigmas 2. Drupe drying black, globose, closely spaced, ca. 2 mm in diam. Fl. Apr–Jul.
Valley forests, on trees; 1300–2100 m. NW, SC to SE Yunnan [Bhutan, E India, N Vietnam].

1a. Leaves large, 6.5–14 × 4–8 cm, glands conspicuously dark reddish, most numerous abaxially along reticulate veins, base usually oblique, obtuse, or shallowly cordate, 7-veined; peduncles shorter than petioles ..... 26a. var. *thomsonii*
1b. Leaves small, 3–5(–7) × 1–2.5 cm, glands pale, uniformly scattered, base obtuse, ± symmetric, 5-veined; peduncles nearly as long as petioles ..... 26b. var. *microphyllum*

26a. Piper thomsonii var. **thomsonii**
球穗胡椒(原变种) qiu sui hu jiao (yuan bian zhong)
Piper bavinum C. de Candolle; *Piper punctulivenum* C. de Candolle; *P. punctulivenum* var. *parvifolium* C. de Candolle.
Petiole 1–2 cm; leaf blade 6.5–14 × 4–8 cm, base usually oblique, obtuse, or shallowly cordate; veins 7. Peduncle shorter than petioles.
Valley forests, on trees; 1300–1700 m. SC to SE Yunnan [Bhutan, E India, Vietnam].
This taxon was included within *Piper sylvaticum* by Long (Fl. Bhutan 1(2): 342–351. 1984).

26b. Piper thomsonii var. **microphyllum** Y. C. Tseng, Acta Phytotax. Sin. 17(1): 39. 1979.

小叶球穗胡椒 xiao ye qiu sui hu jiao
Petiole 5–10 mm; leaf blade 3–5(–7) × 1–2.5 cm, base obtuse, ± symmetric; veins 5. Peduncle nearly as long as petioles.
• Forests, on trees; 1300–2100 m. NW, SC to SE Yunnan.

27. Piper sylvaticum Roxburgh, Fl. Ind. 1: 158. 1820.

长柄胡椒 chang bing hu jiao

Chavica sylvatica (Roxburgh) Miquel.

Climbers herbaceous, dioecious. Stolons present. Stems ridged and furrowed when dry, very finely powdery pubescent when young. Petiole 1–7 cm, very finely powdery pubescent; prophylls 1/2 as long as petioles or slightly longer; leaf blade usually ovate, those at apex of stem ovate-lanceolate, 8–11 × 4–8.5 cm, papery, densely glandular, glabrous except for densely finely powdery pubescent veins abaxially and sometimes base of midvein adaxially, base cordate, symmetric, apex acuminate; veins 7, apical pair arising 0.7–1.5 cm above base, others basal; reticulate veins large, conspicuous, veinlets ascending Spikes leaf-opposed. Male spikes slender, 5–8 cm; bracts orbicular, peltate. Stamens 4; filaments short; anthers reniform. Female spikes erect, 1.5–2.5 cm × 3–4 mm; peduncle 0.5–2 cm, very finely powdery pubescent; bracts orbicular, ± sessile, adaxially pubescent; rachis pubescent, ca. 1.5 mm in diam. Ovary globose, distinct; stigmas 2 or 3, ovate, apex acuminate. Drupe globose, ca. 3 mm in diam., inserted within excavations of rachis. Fl. Aug–Sep.
Wet places within forests; ca. 800 m. Xizang, S Yunnan [Bangladesh, India, Myanmar].
Neither the exact application of the name *Piper sylvaticum* nor the identity of Chinese material so named is clear. The name has never been adequately typified and there are serious discrepancies between the protologue and most material to which the name has been applied.

28. Piper bonii C. de Candolle in Lecomte, Fl. Indo-Chine 5: 85. 1910.

复毛胡椒 fu mao hu jiao

Climbers dioecious. Stems drying brownish black, strong, tomentose. Petiole 4–6 mm, tomentose, sheathed at base only; leaf blade ovate to ovate-lanceolate or elliptic, 4.5–18 × 2.2–8 cm, papery, glandular, abaxially tomentose, especially on veins, most hairs forked, adaxially glabrous or sometimes pubescent at base, base obliquely rounded, apex acuminate; veins 7, apical pair arising 1–2 cm above base, alternate, others basal; reticulate veins prominent Spikes leaf-opposed. Male spikes 6–11 cm × ca. 2 mm; peduncle 0.5–4 cm, tomentose; bracts orbicular, ca. 1 mm wide, peltate, abaxially with 2–5 long hairs, base usually serrulate, stalked. Stamens 3; filaments nearly absent; anthers globose. Female spikes ca. 8 cm, to 5 mm thick in fruit; peduncle, rachis, and bracts as in male spikes. Drupe obovoid, distinct, ca. 2 mm, apex slightly rough. Fl. Feb–Apr.
Thickets or forests, valleys, along streams, on trees or rocks; 300–1200 m. NW and SW Guangxi, Hainan, SE Yunnan [N Vietnam].

1a. Leaves ovate or ovate-lanceolate, 4.5–12 × 2.2–6 cm; peduncles short, 0.5–1.3 cm 28a. var. *bonii*
1b. Leaves elliptic or long elliptic, 12–18 × 6–8 cm; peduncles 2–4 cm ..... 28b. var. *macrophyllum*

28a. Piper bonii var. **bonii**

复毛胡椒(原变种) fu mao hu jiao (yuan bian zhong)
Leaf blade ovate or ovate-lanceolate, 4.5–9 × 2.2–5 cm, apex acuminate. Peduncle 5–10 mm. Fl. Feb–Apr.
Thickets or forests, on trees; 300–1000 m. NW and SW Guangxi, SE Yunnan [N Vietnam].

28b. Piper bonii var. **macrophyllum** Y. C. Tseng, Acta Phytotax. Sin. 17(1): 31. 1979.
大叶复毛胡椒 da ye fu mao hu jiao
Leaf blade elliptic or long elliptic, usually 12–18 × 6–8 cm, apex acute or acuminate. Peduncle much longer than petioles, to 2–4 cm. Fl. Jun–Jul.
• Valleys or along streams, on trees or rocks; 1100–1200 m. Hainan, SE Yunnan.

29. Piper hongkongense C. de Candolle in A. de Candolle, Prodr. 16(1): 347. 1868.
毛瘰 mao ju
Chavica puberula Bentham; *Piper puberulum* (Bentham) Maximowicz (1887), not *P. puberulum* (Bentham) Seemann (1868, based on *Macropiper puberulum* Bentham).
Climbers to several m long, dioecious. Young branches softly hairy, glabrescent. Petiole 5–7 mm, densely pubescent, sheathed at base only; leaf blade ovate-lanceolate or ovate, 5–11 × 2–6 cm, papery, abaxially pubescent, a few hairs dichotomous, adaxially ± glabrescent, base ± cordate, apex acute or acuminate, usually asymmetric; veins 5–7, apical pair arising 1.5–3 cm above base, alternate, others ± basal. Spikes leaf-opposed. Male spikes ca. 7 cm × 3 mm; peduncle slightly longer than petioles, pilose; bracts orbicular, sometimes slightly tapered, peltate, glabrous. Stamens usually 3; filaments very short; anthers reniform. Female spikes 4–6 cm; peduncle, rachis, and bracts as in male spikes. Ovary subglobose; stigmas 4. Drupe globose, ca. 2 mm in diam. Fl. Mar–May.
• Thickets or forests, on trees or rocks; 100–1300 m. Guangdong, Guangxi, Hainan.
There is considerable variation in the indumentum, from densely puberulent to nearly glabrous. This species has been more widely known as *Piper puberulum* or as *P. arboricola*. The name *P. puberulum* is a later homonym of the Fijian species *P. puberulum*, and is thus not available; the material with few hairs was identified as *Piper arboricola* in FRPS, but examination of the type of that name has shown that it is a synonym of *P. kadsura*.

30. Piper sintenense Hatusima, Acta Phytotax. Geobot. 4: 210. 1935.
小叶爬崖香 xiao ye pa ya xiang
Piper hispidum Hayata (1911), not *P. hispidum* Kunth (1815).
Climbers to several m long, dioecious. Stems rooting at nodes, densely roughly rusty brown pubescent when young, sparsely pubescent when old, hairs usually curved toward stem apex. Petiole 0.5–2.5 cm, longest on stoloniferous branches, roughly pubescent, sheathed at base; leaf blade ovate or ovate-oblong, 3.5–5 × 2–3 cm, membranous, finely glandular, abaxially sparsely pilose on veins, adaxially sparsely pilose mostly between veins, with curved hairs, base cordate, slightly oblique, apex acute or obtuse; veins 5–7, apical pair arising 1–2 cm above base, others ± basal; reticulate veins conspicuous; leaf blades toward apex of stem long elliptic, oblong, or ovate-lanceolate, 7–11 × 3–4.5 cm, base oblique or semicordate, apex shortly acuminate. Spikes leaf-opposed. Male spikes 5.5–13 cm × 2–3 mm; peduncle ca. as long as or slightly longer than petioles of leaves toward apex of stem; bracts orbicular, 0.7–1 mm wide, peltate, abaxially glabrous, fascicled pubescent at insertion to rachis, stalk short. Stamens 2; filaments short; anthers subglobose. Female spikes 4–5.5 cm; bracts as in male spikes. Ovary subglobose, distinct; stigmas 4, linear. Drupe obovoid, distinct, ca. 2 mm in diam. Fl. Mar–Jul.
• Forests, usually on trees and rocks; 1000–2500 m. Taiwan.
Material of this species has mostly been named as *Piper arboricola* but the type of that name is clearly conspecific with *P. kadsura*. *Piper sintenense* is very closely related to *P. hongkongense*, differing only in relatively minor quantitative characters, and the two taxa may prove to be conspecific. *Piper laosanum* C. de Candolle, from Laos, might be conspecific and thus would provide an earlier name.
Used medicinally.

31. Piper taiwanense Lin & Lu, Taiwania 40: 356. 1995.
台湾胡椒 tai wan hu jiao
Climbers sparsely minutely puberulent to nearly glabrous, dioecious. Petiole 0.7–1.5 cm; leaf blade ovate to oblong-ovate, 4.5–12 × 2–9 cm, thickly papery, base rounded to cordate, symmetric or oblique, apex acute to rounded; veins 5–7, all basal. Spikes leaf-opposed. Male spikes ± pendulous, 2–6 cm; peduncle 0.8–1.5 cm. bracts orbicular, nearly sessile. Female spikes ± pendulous 1–3.5 cm; peduncle 0.7–2 cm. Ovary ovoid, distinct; stigmas 4–7, linear. Drupe globose.
• Forests at low to middle elevations; ca. 500 m. Taiwan.

32. Piper yinkiangense Y. C. Tseng, Acta Phytotax. Sin. 17 (1): 33. 1979.
盈江胡椒 ying jiang hu jiao
Climbers dioecious. Flowering stems 2–3 mm thick, furrowed, densely villous. Petiole ca. 2 mm, densely hispidulous; prophylls 1–1.5 mm; leaf blade oblique-ovate, 11–14 × 6.5–8.5 cm, membranous, densely finely glandular, abaxially densely pubescent usually along veins, adaxially sparsely hispidulous, base obliquely auriculate-cordate, basal sinus 1–2 mm wide on side of longer and wider lobe, 4–5 mm wide on other side, bilateral difference to 2–3 mm, apex cuspidate and mucronate; veins 8 or 9, apical pair arising 1–2 cm above base, alternate, reaching leaf apex, others basal; reticulate veins conspicuous, veinlets transverse. Male spike not seen. Female spikes leaf-opposed, ca. 3 cm × 4 mm at anthesis; peduncle ca. 2.5 cm, hispidulous; rachis pubescent; bracts suborbicular, stalk short, ca. 1 mm in diam., not entire, adaxially pubescent. Ovary

ovoid, distinct; stigmas 4, reflexed, filiform, ca. 1 mm or longer. Drupe not seen. Fl. Nov.

• Wet places within forests; ca. 1000 m. W Yunnan.

33. Piper puberulilimbum C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 479. 1917.

毛叶胡椒 mao ye hu jiao

Climbers dioecious. Stems pale yellow when dry, ridged, pubescent when young. Petiole 1.2–1.5 cm, pubescent, sheathed at base only; leaf blade ovate to ovate-oblong or elliptic, 7–13 × 3–7 cm, papery, densely glandular, abaxially densely hispidulous, adaxially glabrous, base rounded, ± symmetric, apex acute to slightly acuminate; veins 5–7, apical pair arising ca. 2 cm above base, others basal; reticulate veins conspicuous Spikes leaf-opposed. Male spikes 5–7 cm × ca. 2.5 mm at anthesis; peduncle to 2.2 cm, glabrous to rather densely hispidulous; bracts orbicular, ca. 1 mm wide, peltate, stalked. Stamens 3; filaments slightly longer than anthers; anthers ovoid. Female spikes 6–8(–10) cm × ca. 3 mm at anthesis, 5–9 cm in fruit peduncle to 2.9 cm, usually thicker upward, densely hispid; rachis densely puberulent; bracts ovate, stalk short, ca. 1.5 × 1 mm. Ovary immersed in and connate to rachis; stigmas 4 or 5, linear, deciduous. Drupe subglobose to broadly ovoid, 3–4 mm in diam. Fl. May–Jul.

• Thickets or wet places in forests; 1200–1900 m. S Yunnan.

34. Piper tricolor Y. C. Tseng, Acta Phytotax. Sin. 17(1): 35. 1979.

三色胡椒 san se hu jiao

Climbers dioecious. Stems yellowish when dry, 2–2.5 mm thick, clearly finely striated, glabrous. Petiole 1.5–2 cm, sparsely roughly pubescent; leaf blade elliptic or narrowly ovate, rarely ovate, 7–13 × 4–6.5 cm, papery, without evident glands, abaxially strigose, hairs usually ca. 1 mm, adaxially glabrous, base ± rounded, symmetric or nearly so, apex acuminate; veins 7, apical pair arising 0.5–2 cm above base, alternate, reaching leaf apex, others basal; reticulate veins raised; leaf blades toward apex of stem narrowly ovate, 6–11 × 1.5–4.5 cm, base rounded or slightly tapered, usually oblique, apex acuminate. Male spike not seen. Female spikes leaf-opposed, ca. 3.5 cm × 4 mm before anthesis; peduncle 1.5–2.5 cm, glabrous; rachis pubescent, bracts suborbicular, stalk shortly pubescent. ca. 1.6 mm in diam., when dry with black center (ca. 1 mm in diam.) surrounded by thick, narrow, white band and thinner, pale yellow margin. Ovary ovoid, distinct, glabrous; stigmas 4 or 5, very short and reflexed. Drupe not seen.

• Yunnan.

35. Piper macropodum C. de Candolle, Bull. Herb. Boissier, sér. 2, 4: 1026. 1904.

粗梗胡椒 cu geng hu jiao

Piper szemaoense C. de Candolle.

Climbers roughly pubescent to glabrous except for rachis, dioecious. Stems yellow when dry, ridged. Petiole (0.3–)1.2–1.5 cm, sheathed at base only; leaf blade ovate-oblong or narrowly elliptic to elliptic, 7–23 × 3.5–8 cm, papery, densely glandular, base rounded to shortly tapered, ± symmetric to asymmetric, bilateral difference to 5 mm, apex acute to acuminate; veins 7 or 8, apical pair arising 1/4–2/5 way along midvein, alternate, others ± basal to ca. 1/8 way along midvein; reticulate veins abaxially prominent. Spikes leaf-opposed. Male spikes 7–14 cm at anthesis; peduncle 2.5–3.7 cm, longer than petioles; rachis conspicuously densely yellowish pubescent; bracts orbicular or suborbicular, 1–1.7 mm wide, peltate, stalk short. Stamens 3; filaments short; anthers ovoid, 2-loculed. Female spikes 6–8 cm at anthesis, 10–15 cm in fruit; peduncle usually thicker upward, ca. as long as male peduncles, thickened in fruit, densely and roughly orange pubescent; bracts as in male spikes but sessile. Ovary inserted within excavation of rachis; stigmas 4 or 5, linear, deciduous. Drupe subglobose to ovoid, 4–5 mm, densely tuberculate. Fl. Aug–Oct.

• Forests, particularly in wet places; 800–2600 m. Yunnan.

Hairy forms of *Piper macropodum* have been separated as *P. szemaoense*.

36. Piper boehmeriifolium (Miquel) C. de Candolle in A. de Candolle, Prodr. 16(1): 348. 1868.

苎叶瘰 zhu ye ju

Chavica boehmeriifolia Miquel, Syst. Piperac. 265. 1843.

Subshrubs erect, 1–3(–5) m high, glabrous to ± uniformly hairy, dioecious, most parts usually drying black. Stems terete to thickly ridged when dry, minutely papillate to smooth, usually glabrous. Petiole (2–)3–10 mm, glabrous or sometimes sparsely pubescent; leaf blades toward base of stem elliptic, narrowly elliptic, oblong, oblong-lanceolate, or ± ovate, (8–)11–24 × (2.5–)4–9.5 cm, papery to thinly papery, densely finely glandular, abaxially glabrous or occasionally puberulent, adaxially glabrous except sometimes for sparsely pubescent veins, base oblique, 1 side rounded, other side tapered and acute, bilateral difference 2–3 mm, apex acute to long acuminate; veins 6–10, usually 1 more lateral vein on wider side, apical pair arising 1/3–1/2 way along midvein, alternate, reaching leaf apex, next pair often also above base; reticulate veins conspicuous, transversely oblong. Spikes mostly leaf-opposed, often terminal in male plants. Male spikes 10–16(–23) cm × 2–3 mm; peduncle 1–3.5 cm; bracts ± orbicular, 1–2(–2.5) mm wide, peltate, glabrous, obconical, shorter than wide, Stamens 2; filaments thick, short; anthers reniform. Female spikes 6–12 cm; peduncle and bracts as in male spikes; rachis sparsely pubescent; bracts 1–1.4 mm or slightly wider in diam.

Stigmas deciduous. Drupes densely clustered, subglobose, distinct, 1.2–3 mm in diam. Fl. Dec–Jul.
Forests; 500–2200 m. Guangdong, Guangxi, Guizhou, Yunnan [Bhutan, NE India, Malaysia, Myanmar, Sikkim, Thailand, N Vietnam].

1a. Leaves (6 or)7- or 8(or 9)-veined; drupes 2–3 mm in diam. ..... 36a. var. *boehmeriifolium*
1b. Leaves 9- or 10-veined; drupes 1.2–1.5 mm in diam. ..... 36b. var. *glabricaule*

36a. Piper boehmeriifolium var. **boehmeriifolium**
苎叶瘰(原变种) zhu ye ju (yuan bian zhong)
Piper boehmeriifolium var. *tonkinense* C. de Candolle; *Piper spirei* C. de Candolle; *P. spirei* var. *pilosius* C. de Candolle; *P. terminaliflorum* Y. C. Tseng.
Subshrubs 2–3(–5) m high, glabrous to ± uniformly hairy. Stems ridged when dry, sometimes minutely papillate. Petiole (2–)4–10 mm; leaf blades toward base of stem elliptic, oblong, oblong-lanceolate, or ± ovate, (8–)11–24 × (2.5–)4–8(–9.5) cm, thinly papery, base with bilateral difference ca. 2 mm; veins (6 or)7 or 8(or 9). Female spikes 10–12 cm. Drupes 2–3 mm in diam. Fl. Apr–Jul.
Forests; 500–2200 m. Guangdong, Guangxi, Guizhou, Yunnan [Bhutan, NE India, Malaysia, Myanmar, Sikkim, Thailand, N Vietnam].
Male plants sometimes have apical leaves reduced and inflorescences effectively terminal. Y. C. Tseng believes that these should be placed in a distinct species, *Piper terminaliflorum*. Such plants have been observed throughout the range of *P. boehmeriifolium* and M. G. Gilbert and N. H. Xia believe that they are better regarded as just an extreme variant of a widespread and rather variable species.
Used medicinally.

36b. Piper boehmeriifolium var. **glabricaule** (C. de Candolle) M. G. Gilbert & N. H. Xia, Novon 9: 191. 1999.
光茎胡椒 guang jing hu jiao
Piper glabricaule C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 477. 1917.
Subshrubs to more than 1.5 m high, glabrous except for rachis and bases of bracts. Stems terete, usually smooth. Petiole 3–6 mm on wider side; leaf blades elliptic, narrowly elliptic, or oblong, rarely those toward base of stem broadly elliptic, 15–21 × 6–9.5 cm, papery, base with bilateral difference 2–3 mm; veins 9 or 10. Female spikes 6–8 cm. Drupe 1.2–1.7 mm in diam. Fl. Dec–Mar.
• Valleys or wet places within forests; 1300–1700 m. S Yunnan.

37. Piper dolichostachyum M. G. Gilbert & N. H. Xia, Novon 9: 192. 1999.
长穗胡椒 chang sui hu jiao
Herbs erect and shrubby (probably), most parts with reddish brown hairs, dioecious. Stems 3–4 mm thick, furrowed when dry, glabrescent. Petiole 5–13 mm, densely pubescent, prophyll to 3 cm, glabrous; leaf blade elliptic-lanceolate to obovate, strongly asymmetric, 14–25 × 6–11 cm, thinly papery, without evident glands, abaxially densely brown pubescent, nearly tomentose on veins, adaxially sparsely minutely scabrid, base strongly obliquely cordate, basal lobes overlapping, bilateral difference to 3 mm, apex long acuminate; veins 8–10, 3 on narrower side, up to 7 on wider side, apical pair arising 2–6 cm above base, alternate, nearly reaching leaf apex, next pair often also above base; reticulate veins lax, transversely oblong, slightly raised abaxially. Male spikes not seen. Female spikes leaf-opposed, 27–30 cm × 6–7 mm in fruit; peduncle 4–4.5 cm, glabrous; rachis pubescent; bracts orbicular, peltate, margin pale when dried, 1.5–1.7 mm in diam. Ovary ± cylindric; stigmas 3 or 4, reflexed, very short and inconspicuous. Drupes densely packed, prismatic-cylindric, ca. 2 × 1.5 mm. Fr. Apr.
• Wet places within forests. S Yunnan (Xishuangbanna Daizu Zizhizhou).
Plants of this species were named as *Piper spirei* in FRPS, but examination of the type of that name has shown that it belongs to *P. boehmeriifolium*.

38. Piper pedicellatum C. de Candolle, J. Bot. 4: 164. 1866.
角果胡椒 jiao guo hu jiao
Piper curtipedunculum C. de Candolle.
Climbers glabrous except for rachis and bases of bracts, dioecious. Stems drying blackish, 1–2 mm thick, finely striated when dry. Petiole 5–10 mm, sheathed at base only; leaf blade ovate or narrowly ovate to elliptic, 7–14 × 4–8 cm, papery, finely glandular, base oblique, sometimes higher side rounded, bilateral difference ca. 2 mm, apex acute to acuminate; veins (7–) 9, apical pair arising 2–4 cm above base, alternate, next pair 0.5–1.5 cm above base; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 15–25 cm × 2–3 mm; peduncle to 2 cm; bracts orbicular, 0.5–1 mm wide, peltate, stalk 1–1.2 mm, base pubescent. Stamens 2; filaments very short to ± absent; anthers ovoid to globose. Female spikes 9–14 cm × ca. 3.5 mm at anthesis, 4–5 mm thick in fruit; peduncle nearly 2 × as long as petioles; rachis roughly pubescent; bracts orbicular, stalk to 1 mm, 0.8–1 mm in diam. Ovary globose, distinct; stigmas 3 or 4, linear. Drupe obovoid, 4-angled, 1.5–2 mm. Fl. Apr–Jun.

Forests, on trees; 1000–1900 m. SE, S to W Yunnan [E Bangladesh, Bhutan, NE India, Sikkim, N Vietnam].

Similar to *Piper boehmeriifolium* but differing in its climbing habit, smaller, often very long-stalked bracts, and angular fruits.

39. Piper wangii M. G. Gilbert & N. H. Xia, Novon 9: 197. 1999.

景洪胡椒 jing hong hu jiao

Climbers glabrous except for rachis, dioecious. Stems finely striated, tuberculate. Petiole 1–1.5 cm; leaf blade obliquely broadly elliptic to ovate, (12.5–)15–21 × 7–12 cm, papery, densely finely glandular, base rounded-cuneate, ± oblique, apex acute to acuminate; veins (5–)7(–9), apical pair arising (2–)3–6.5 cm above base, nearly reaching apex, 1(or 2) pair(s) basal; reticulate

veins conspicuous. Male spikes not seen. Female spikes leaf-opposed, 3–5 cm in young fruit; peduncle 1–1.4 cm; bracts orbicular, stalk pilose, 0.7–1 mm in diam., margin not entire, glabrous abaxially. Ovary distinct; stigmas 3 or 4, short, ovate-lanceolate. Unripe drupe subglobose, 1.5–2 mm in diam., umbonate. Fl. May–Jun, Oct.

• Forests, on rocks; 800–1100 m. S to SW Yunnan.

This species was at first identified as *Piper pubicatulum* C. de Candolle. However, the type of that species (from Vietnam) has nearly symmetric leaves with only 5 veins, shorter peduncles, and fruits only ca. 1 mm in diam.

40. Piper yui M. G. Gilbert & N. H. Xia, Novon 9: 197. 1999.

椭圆叶胡椒 tuo yuan ye hu jiao

Climbers woody, dioecious. Stems dark brown when dry, striated, minutely hispidulous when young. Petiole 0.8–1.4 cm, hispidulous; leaf blade elliptic, to 9 × 4.5 cm, papery, drying dark green, finely glandular, very finely and sparsely puberulent on veins, otherwise glabrous, base obliquely cordate to ± rounded, bilateral difference to 3 mm, nearly symmetric in apical leaves, apex rounded to broadly acute; veins 5(–7), apical pair arising 3–8(–1.2) mm above base, others basal; reticulate veins slender, raised on both sides in dry material. Male spikes not seen. Female spikes leaf-opposed, to 15 cm in fruit; peduncle to 5.3 cm; rachis and undersides of bracts densely brownish hairy; bracts obovate, ca. 1.5 × 1 mm. Ovary ovoid, partly connate to rachis; stigmas 3 or 4, ellipsoid, reflexed. Drupe (immature) ellipsoid, ca. 6 × 3 mm, slightly rugulose, partly connate to rachis. Fr. (immature) Sep–Oct.

• About 1300 m. Yunnan.

41. Piper arborescens Roxburgh, Fl. Ind. 1: 161. 1820.

兰屿风藤 lan yu feng teng

Piper arborescens var. *angustilimbum* Quisumbing; *Piper kotoense* Yamamoto.

Climbers glabrous except for rachis, dioecious. Stems many ridged, nodes markedly enlarged, glabrous. Petiole 5–10 mm, tuberculate; leaf blade ovate-lanceolate or ovate, 9–13 × 3–6 cm, papery to ± leathery, glabrous, base rounded, usually with a small lobe adnate to and narrower than petioles, ± symmetric, apex caudate with mucro 1–2 cm; veins 5, all basal, abaxially prominent. Spikes leaf-opposed. Male spikes longer than leaf blades; peduncle longer than petioles, glabrous; rachis hispid; bracts orbicular or suborbicular, 0.6–0.9 mm wide, peltate, glabrous, ± sessile. Stamens 2 or 3; anthers reniform. Female spikes ca. 8 cm × 2.5 mm or longer; peduncle and rachis as in male spikes; bracts ± 5-lobed, stalk 0.5–1 mm, pubescent. Ovary globose, base tapered; stigmas 3 or 4. Drupe ellipsoid, 1.5–2 × 0.6–0.8 mm. Fl. Mar–Jun.

Forests. Taiwan [Malaysia, Philippines].

42. Piper tsangyuanense P. S. Chen & P. C. Zhu in Y. C. Tseng, Acta Phytotax. Sin. 17(1): 36. 1979.

粗穗胡椒 cu sui hu jiao

Climbers dioecious. Stems black when dry, ca. 6 mm thick, ridged. Petiole 1.5–2 cm, prophylls ca. 1/3 as long as petioles; leaf blades toward base of stem elliptic, 13–15 × 5.5–6 cm, papery, densely finely glandular, base rounded and emarginate, sinus only 1/2 as wide as petiole, apex acute; veins 7, apical pair arising 2–2.5 cm above base, alternate, reaching leaf apex; reticulate veins conspicuous, ± transversely oblong; leaf blades toward apex of stem ovate-lanceolate or narrowly elliptic, 6–9 × 2–3.5 cm, base gradually tapered or cuneate, rarely rounded, usually emarginate, sinus narrower than petiole, apex caudate-acuminate. Male spikes not seen. Female spikes leaf-opposed, 25–30 × ca. 1 cm in fruit; peduncle ca. 5 cm, finely striated; rachis pubescent; bracts suborbicular, sometimes base slightly tapered, peltate, stalk short, ca. 1.5 mm in diam., margin densely ciliolate. Ovary deeply immersed in rachis; stigmas 3–5, linear. Unripe drupe mostly immersed in rachis, 4- or 5-sided, scabrous, umbonate. Fl. May–Jun.

• Forest margins and wet places along streams; ca. 1600 m. W Yunnan.

43. Piper ponesheense C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 476. 1917.

肉轴胡椒 rou zhou hu jiao

Climbers glabrous except for rachis and bases of bracts when mature, dioecious. Stems grayish black when dry, thickly ridged, sparsely roughly pubescent when young. Petiole 1(–1.5) cm, hispid, especially adaxially, sheathed at base only; leaf blades ovate, those at apex of stem longer, 4.5–9 × 2.5–6 cm, papery, without glands, glabrous, base rounded, slightly oblique, apex acute; veins 7, abaxially very prominent, apical pair arising 0.8–2 cm above base; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 5–8.5 cm × ca. 2 mm; peduncle hispid, ca. 1 cm; rachis glabrous; bracts orbicular, ca. 1 mm wide, peltate, sessile. Stamens 3; filaments thick, nearly as long as anthers; anthers reniform. Female spikes 3–3.5 cm × ca. 2 mm at anthesis, drying black; peduncle and rachis as in male spikes; bracts suborbicular, sometimes base slightly tapered, 1–1.1 × 0.5–0.6 mm. Ovary ovoid, partly connate to rachis; stigmas 3, ellipsoid, ca. 0.5 mm. Drupe not seen. Fl. Mar–Apr.

Hilltops, valley forests, on rocks or trees; 1400–2000 m. S to SW Yunnan [Myanmar].

44. Piper infossibaccatum A. Huang, Guihaia 10: 295. 1990.

嵌果胡椒 qian guo hu jiao

Climbers to 10 m, glabrous throughout, dioecious. Stems slender, nodes swollen, internodes 6–10 cm. Petiole 5–10 mm; leaf blade ovate, 6–10 × 2–4 cm, rigidly papery, base cuneate, symmetric or slightly oblique, apex acute to ± acuminate; veins 5, apical pair arising 1–2 cm above base, alternate, others basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 2–5 cm × ca. 2 mm; peduncle 2–3 × as long as petiole; bracts orbicular or suborbicular, ca. 1.5 mm wide, peltate, subsessile. Stamens 2; filaments very short. Female spikes 1.5–3 cm × ca. 2 mm; peduncle 1.5–3 cm, slender, bracts as in male spikes. Ovary immersed in and connate to rachis; stigmas 3. Drupe globose, 2.5–3 mm, partly connate to rachis.

• 700–1100 m. Hainan.

The protologue compared this species with *Piper hancei* but the infructescence is very similar to that of *P. austrosinense*.

45. Piper austrosinense Y. C. Tseng, Acta Phytotax. Sin. 17 (1): 36. 1979.

华南胡椒 hua nan hu jiao

Climbers woody, glabrous except for rachis and bracts, dioecious. Stems ridged, rooting at nodes. Petiole 0.4–2 cm, shorter in leaves toward apex of stem, prophylls ca. 1/2 as long as petiole; leaf blades toward base of stem ovate, 8.5–11 × 6–7 cm, papery, without evident glands, base usually cordate, symmetric, apex acute; veins 5(–7), all ± basal; reticulate veins conspicuous, transversely oblong toward apex; leaf blades toward apex of stem narrowly ovate, 6–11 × 1.5–4.5 cm, base usually oblique, rounded or slightly tapered, apex acuminate. Spikes leaf-opposed. Male spikes white, 3–6.5 cm × ca. 2 mm; peduncle 1–1.8 cm; rachis and undersides of bracts densely white pubescent; bracts orbicular, ca. 1 mm wide, peltate, sessile. Stamens 2; filaments nearly as long as anthers. Female spikes white, 1–1.5 cm × ca. 3 mm; peduncle nearly as long as rachis; bracts as in male spikes. Ovary partly immersed in rachis; stigmas 3 or 4, tomentose. Drupe globose, ca. 2 mm in diam., partly immersed in rachis. Fl. Apr–Jun.

• Forests, on trees or rocks; 200–600 m. E and SW Guangdong, SE Guangxi, Hainan.

Material of this species lacking fruit has often been confused with *Piper hancei*. However, *P. austrosinense* can be easily distinguished by its white flowers, whereas *P. hancei* has yellow flowers.

46. Piper senporeiense Yamamoto, Contrib. Fl. Kainan. 1: 21. 1943.

斜叶瘰 xie ye ju

Climbers woody, glabrous except sometimes for finely puberulent leaves, dioecious. Stems rooting at nodes, internodes striated. Petiole 3–5 mm; leaf blade elliptic or oblong, 9–15 × 3.5–5 cm, membranous to papery, glandular, glabrous or sometimes abaxially very sparsely pubescent, base oblique, usually one side broad and rounded, other side narrow and cuneate, bilateral difference 2–4 mm, apex acuminate to long acuminate; veins 5–7, apical pair arising 3–5 cm above base; reticulate veins abaxially prominent. Spikes leaf-opposed. Male spikes 4–4.5 cm × ca. 1.5 mm overall; peduncle 5–10 mm; bracts orbicular, ca. 0.8 mm wide, peltate, sparsely gland dotted, ± sessile. Stamens 2 or 4; filaments very short or inconspicuous; anthers ellipsoid. Female spikes 2–3.5 cm × ca. 3 cm; peduncle slightly longer than petioles; bracts as in male spikes. Ovary globose, partly connate to rachis; stigmas 3 or 4. Drupe globose, ca. 2.5 mm in diam., partly connate to rachis. Fl. Apr–Jul.

• Forests, on trees or rocks. Hainan.

47. Piper nudibaccatum Y. C. Tseng, Acta Phytotax. Sin. 17 (1): 37. 1979.

裸果胡椒 luo guo hu jiao

Piper betle Linnaeus var. *psilocarpum* C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 478. 1917.

Climbers mostly glabrous, dioecious. Stems ridged, ± tuberculate. Petiole 1.2–2 cm; prophyll nearly as long as petiole; leaf blade elliptic, long elliptic, or ovate-oblong, 10–19 × 3.5–9 cm, papery, glaucous when dry, finely glandular, base gradually tapered sometimes rounded in leaf blades toward base of stem, symmetric or nearly so, apex acute to acuminate; veins 7, apical pair arising 3–6 cm above base, usually alternate, others ± basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes 6–7 cm × ca. 2 mm; peduncle ca. 2 cm; bracts suborbicular to obovate, base tapered, ca. 0.8 mm wide, peltate, stalk short, pubescent. Stamens 2; filaments short; anthers reniform. Female spikes 6–8 cm, to 14 cm in fruit; peduncle mostly 3–4 cm; rachis and bracts as in male spikes. Ovary globose, immersed in rachis; stigmas 4 or 5, reflexed, linear, densely pubescent. Drupe globose, ca. 5 mm in diam., partly connate to rachis. Fl. Apr–Jun.

• Forests; 900–2000 m. S Yunnan.

48. Piper flaviflorum C. de Candolle, Notizbl. Bot. Gart. Berlin-Dahlem 6: 477. 1917.

黄花胡椒 huang hua hu jiao

Climbers to more than 10 m, glabrous except for rachis and bases of bracts, dioecious. Stems brown when dry, 2–3 mm thick, finely ridged. Petiole 1–2.2 cm; leaf blade elliptic or ovate-oblong, 13–18 × 4–8.5 cm, pale yellowish gray when dry, papery, finely glandular (only visible with hand lens), leaf blades toward base of stem with base obliquely rounded, bilateral difference more than 4 mm, apex acuminate; veins 7, apical pair arising 1/3 way along midvein, alternate, others ± basal; reticulate veins conspicuous; leaf blades toward apex of stem with base ± symmetrically cuneate. Spikes leaf-opposed, yellow. Male spikes 14–21 cm × ca. 2 mm; peduncle slightly longer than petioles; bracts obovate, ca. 1 × 1 mm, membranous, peltate, stalk short, inserted at edge of excavation. Stamens 2, in excavations; filaments very short; anthers reniform. Female spikes 10–14 cm, to 18 cm in fruit; peduncle and rachis as in

male spikes; bracts thick, stalk fleshy, thick, nearly as large as bract, ca. 1.2 × 1 mm. Ovary ovoid, inserted within excavations of rachis; stigmas 3(or 4), linear. Drupe yellow, globose, ca. 4 mm in diam. Fl. Nov–Apr.

• Near villages, in valleys and forests, on large trees; 500–1800 m. C and S Yunnan.

Used medicinally.

49. Piper tsengianum M. G. Gilbert & N. H. Xia, Novon 9: 196. 1999.

瑞丽胡椒 rui li hu jiao

Shrubs climbing, 1.2–2 m, apparently glabrous, dioecious. Stems pale brown when dry, 2–2.5 mm thick, terete, striate. Petiole 0.8–1.3 cm; leaf blade lanceolate, 8–10.5 × 3.2–4.5 cm, papery, without evident glands, abaxially with dense layer of probably sessile scales, base rounded to subcuneate, symmetric, apex long acuminate; veins 5, apical pair arising 0.5–1.5 cm above base, alternate, other pair basal; reticulate veins raised adaxially, inconspicuous abaxially. Spikes leaf-opposed. Male spikes 7–20 cm × 2–2.5 mm; peduncle to 1.8 cm; rachis densely hairy; bracts orbicular, 1.3–1.5 mm wide, peltate, obscurely gland dotted, subsessile. Stamens 3 or 4; filaments longer than anthers; anthers ovoid. Female plant not seen. Fl. May.

• Mixed forests, on large trees; 2200–2300 m. Yunnan.

50. Piper wallichii (Miquel) Handel-Mazzetti, Symb. Sin. 7: 155. 1929.

石南藤 shi nan teng

Chavica wallichii Miquel, Syst. Piperac. 254. 1843; *Piper aurantiacum* Wallich ex C. de Candolle, nom. illeg. (included *Chavica wallichii*); *P. aurantiacum* var. *hupeense* C. de Candolle; *P. emeiensis* Y. C. Tseng; *P. henryci* C. de Candolle; *P. ichangense* C. de Candolle; *P. martinii* C. de Candolle; *P. wallichii* var. *hupeense* (C. de Candolle) Handel-Mazzetti.

Climbers dioecious. Stems black when dry, ridged, usually hispidulous. Petiole 1–2 cm, hispidulous, prophylls 1/4–1/3 as long as petioles; leaf blades ovate-lanceolate or narrowly elliptic, rarely those toward base of stem ovate, 5–14 × 2–6.5 cm, papery, abaxially hispidulous, sometimes glabrescent, drying grayish, adaxially glabrous, base rounded to shortly tapered, basal leaves often slightly cordate, symmetric to slightly oblique, apex acuminate; veins 5–7, apical pair arising 1–1.5 cm above base, alternate or ± opposite, others basal. Spikes leaf-opposed. Male spikes more than 2 × as long as leaf blades; peduncle 2.5–3 × as long as petioles, pubescent; rachis sparsely pubescent; bracts orbicular, 1–1.2 mm wide, peltate, ± sessile. Stamens 3; anthers reniform. Female spikes 1.5–3 cm, to 6 cm in fruit; peduncle 2–4.2 cm, pubescent; rachis and bracts as in male spikes; bract stalk not elongated in fruit, sparsely pubescent. Ovary distinct, apex sharply pointed; stigmas 3 or 4, linear. Drupe subglobose, ca. 3 mm in diam., ± tuberculate. Fl. Feb–Jun.

Forests, on trees and rocks in shady and wet places; 300–2600 m. S Gansu, N Guangdong, Guangxi, Guizhou, SW Hubei, W Hunan, Sichuan, Yunnan [Bangladesh, E India, ?Indonesia, Nepal].

There was confusion in the application of this name in FRPS, with the records divided between *Piper martinii* and *P. wallichii*. These records have been consolidated within *P. wallichii* as defined here. Y. C. Tseng believes that material from Emei Shan, Sichuan, with relatively broad, subpalmately veined leaves, should be recognized as a distinct species. M. G. Gilbert and N. H. Xia believe that such material is better regarded as a form that has flowered prematurely on normally sterile climbing stems.

Used medicinally.

51. Piper kadsura (Choisy) Ohwi, Acta Phytotax. Geobot. 3: 81. 1934.

风藤 feng teng

Ipomoea kadsura Choisy, Mém. Soc. Phys. Genève 6: 475. 1833; *Piper arboricola* C. de Candolle; *P. futokadsura* Siebold; *P. subglaucescens* C. de Candolle.

Climbers woody, dioecious. Stems rooting at nodes, ridged, sparsely pubescent when young. Petiole 1–1.5 cm, sometimes pubescent, sheathed at base only; leaf blade ovate or long ovate, 6–12 × 3.5–7 cm, ± leathery, abaxially usually pubescent on veins, adaxially glabrous, with uniformly scattered raised white glands, base cordate to rounded, ± symmetric, apex acute or obtuse; veins 5, apical pair arising up to 1.5 cm above base, others basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes yellow, ascending, 3–5.5(–12) cm × ca. 2.5 mm; peduncle 0.6–1.5 cm; rachis hispidulous; bracts yellow, orbicular, ca. 1 mm wide, peltate, margin irregular, abaxially roughly white pubescent, ± sessile. Stamens 2 or 3; filaments short. Female spikes shorter than leaf blades; peduncle ca. as long as petioles; rachis and bracts as in male spikes. Ovary globose, distinct; stigmas 3 or 4, linear, pubescent. Drupe brownish yellow, globose, 3–4 mm in diam. Fl. May–Aug.

Lowland forests, on trees or rocks; 200–1500 m. Taiwan [Japan, S Korea].

This species has been recorded from Fujian and Zhejiang, but the material from those provinces differs from typical *Piper kadsura* in having the abaxial leaf surface uniformly hairy and the peduncles much longer, and seems better regarded as a form of *Piper wallichii*. The epithet is frequently spelled *"kadzura,"* but there does not seem sufficient justification to treat the spelling used in the protologue as an orthographic error. The synonym *Piper arboricola* C. de Candolle has nearly always been midapplied to material of *P. sintenense*.

52. Piper kwashoense Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 235. 1911.

绿岛胡椒 lu dao hu jiao

Climbers glabrous throughout, dioecious. Stems rooting at clearly enlarged nodes, ridged. Petiole ca. 1–3(–4) cm, many striated, very shortly pubescent, sheathed at base only; leaf blade cordate-orbicular, 6–10(–15) × 5–8(–15) cm, papery to ± leathery, both surfaces glaucous and glabrous, base cordate, sometimes peltate or subpeltate, apex cuspidate, mucro ca. 15 × 3–4 mm;

veins 5, slender, prominent on both surfaces. Spikes leaf-opposed. Male spikes white, ascending, 5–8 cm; peduncle 0.6–1.5 cm. Female spikes 1–2.5 cm; peduncle ca. 1 cm. Stigmas 3 or 4. Drupe red, globose, ca. 2 mm in diam. Fl. Aug.

• Lowland forests. S Taiwan.

This taxon has sometimes been named as *Piper philippinum* Miquel (e.g., in Fl. Taiwan, ed. 2), following the account of Piperaceae in the Philippines by E. Quisumbing (Philipp. J. Sci. 43: 1–246. 1930). However, F. A. W. Miquel's protologue of *P. philippinum* (Syst. Piperac. 322. 1843) clearly excludes *P. kwashoense* as described by Quisumbing because it refers to a plant with 5-veined leaves, lax female inflorescences 10–12 cm long, and ovoid fruits 4–5 mm long and apparently free from the rachis. The mistake seems to have come from Miquel, who based the protologue on a female plant, "*Cuming* in herb. de Lessert 1642," and then added a note that another collection, *Cuming 912*, might be the male of the same species although it did have a number of differences. This latter collection is much more widely distributed in herbaria, and *P. philippinum* has been interpreted as if *Cuming 912* were the type.

53. Piper kawakamii Hayata, J. Coll. Sci. Imp. Univ. Tokyo 30: 234. 1911.

恒春胡椒 heng chun hu jiao

Climbers glabrous except for rachis, dioecious. Stems black when dry, rooting at nodes, deeply furrowed and thickly ridged. Petiole 4–10(–15) mm; prophyll ca. 1/2 as long as petiole; leaf blade ovate, in apical leaves elliptic, 8–13(–18) × 3.5–8.5 cm, thinly papery, abaxially densely glandular, base rounded or shallowly cordate, in apical leaves sometimes shortly tapered, usually symmetric, apex acute to shortly acuminate; veins 7, outermost pair very slender, apical pair arising 1–2 cm above base, alternate, reaching middle of leaf, others basal; reticulate veins conspicuous. Spikes leaf-opposed. Male spikes ascending, 3.5–5 cm × ca. 4 mm; peduncle ca. 1.5 cm; bracts orbicular or obovate, 1.1–1.5 mm wide, peltate, adaxially villous, margin not entire, stalk villous. Stamens 2; filaments short. Female spikes 2–3.5 cm; peduncle, rachis, and bracts as in male spikes. Ovary ovoid, distinct; stigmas 4, linear, reflexed. Drupe not seen. Fl. May–Jul.

Forests, on trees or rocks; near sea level to 800 m. S Taiwan [N Philippines].

54. Piper hancei Maximowicz, Bull. Acad. Imp. Sci. Saint-Pétersbourg, 3, 31: 94. 1887.

山蔞 shan ju

Chavica leptostachya Hance, J. Bot. 6: 301. 1868, not *Piper leptostachyon* Nuttall (1822); *P. matthewii* Dunn.

Climbers to more than 10 m, glabrous except for rachis and bases of bracts, dioecious. Stems rooting at nodes, finely striated. Petiole 5–12 mm; prophyll ca. 1/2 as long as petiole; leaf blade ovate-lanceolate or elliptic, rarely lanceolate, 6–12 × 2.5–4.5 cm, papery to ± leathery, base gradually tapered or cuneate, sometimes rounded, symmetric or nearly so, apex acute or acuminate; veins 5(–7), apical pair arising 1–3 cm above base, alternate, nearly reaching leaf apex; reticulate veins usually conspicuous. Spikes leaf-opposed. Male spikes yellow, 6–10 cm × ca. 2 mm; peduncle ca. as long as petioles or slightly longer; rachis pubescent; bracts suborbicular, ca. 0.8 mm wide, peltate, adaxially pilose, ± sessile to shortly stalked. Stamens 2. Female spikes ca. 3 cm, longer in fruit; bracts as in male spikes but petioles slightly longer. Ovary subglobose, distinct; stigmas (3 or)4. Drupe yellow, globose, 2.5–3 mm in diam. Fl. Mar–Aug.

• Forests, on trees or rocks; near sea level to 1700 m. Fujian, Guangdong, Guangxi, S Guizhou, S Hunan, SE Yunnan, Zhejiang. Used medicinally.

55. Piper rubrum C. de Candolle, Annuaire Conserv. Jard. Bot. Genève 2: 273. 1898.

红果胡椒 hong guo hu jiao

Climbers glabrous except for rachis and bases of bracts, dioecious. Stems drying brown, ca. 2 mm thick, densely and finely striated. Petiole (0.4–)1–1.5 cm, sheathed at base only; leaf blade oblong or ovate-lanceolate, 7–12 × 2.5–3 cm, papery, densely glandular, base slightly tapered or rounded, symmetric, apex acuminate to long acuminate and mucronate; veins 5, adaxially sulcate, abaxially prominent, apical pair usually arising 1.5 cm above base, nearly reaching leaf apex, other pair basal; reticulate veins abaxially conspicuous. Spikes leaf-opposed. Male spikes less than 1.5 cm when young; peduncle longer than opposing young leaf petioles; bracts orbicular, ca. 0.7 mm wide, peltate, pubescent, stalked. Stamens 2; filaments inconspicuous when young. Female spikes ca. 6.5 cm; peduncle slightly longer than petioles; rachis villous; bracts orbicular, stalk long, obconical, pubescent. Ovary distinct; stigmas 3, lanceolate. Drupe red, drying brown, globose, ca. 3 mm in diam. Fl. Apr–May.

Climbing on trees; 300–400 m. S Yunnan [N Vietnam].

56. Piper bambusifolium Y. C. Tseng, Acta Phytotax. Sin. 17 (1): 38. 1979.

竹叶胡椒 zhu ye hu jiao

Climbers glabrous except for rachis, dioecious. Flowering stems slender, without evident ridges when dry. Petiole 4–6 mm, sheathed at base only; leaf blade lanceolate to narrowly lanceolate, 4–8 × 1.2–2.5(–3) cm, thickly papery, finely glandular, often drying pale brown, base slightly tapered or rounded, symmetric, apex long acuminate; veins (4 or)5, apical pair arising 1–1.5 cm above base, alternate, sometimes 1 inconspicuous, looped 2/3 way up; reticulate veins inconspicuous. Spikes leaf-opposed. Male spikes yellow, ca. 1/2 as long as leaf blades, usually 2–4 cm × ca. 1.5 cm; peduncle ca. as long as petioles or slightly longer; bracts orbicular, ca. 0.8 mm wide, peltate, margin not entire, ± sessile to shortly stalked. Stamens 3; filaments slightly longer than anthers; anthers reniform. Female spikes to 1.5 cm at anthesis; peduncle slightly longer than petioles; rachis hairy; bracts as in male spikes. Ovary distinct; stigmas 3 or 4, ovate-

acuminate, short. Drupe drying red, globose, 2–2.5 mm in diam., smooth. Fl. Apr–Jul.

• Forests, on rocks or trees; 300–1200 m. Guizhou, SE Hubei, C and N Jiangxi, NE and SE Sichuan.

57. Piper suipigua Buchanan-Hamilton ex D. Don, Prodr. Fl. Nepal. 20. 1825.

滇西胡椒 dian xi hu jiao

Chavica suipigua (Buchanan-Hamilton ex D. Don) Miquel; *Piper nepalense* Miquel.

Climbers glabrous except for rachis and bases of bracts, dioecious. Stems rooting at nodes, clearly ridged, usually tuberculate. Petiole 1.1–3 cm, sheathed at base only; leaf blade long ovate, oblong, or narrowly elliptic, 6–12 × 2–5.5 cm, ± leathery, glandular, base rounded, obliquely tapered in apical leaves, usually symmetric, apex caudate-acuminate, mucro straight or curved; veins 5(–7), abaxially prominent, apical pair arising 0.6–2 cm above base, usually opposite, nearly reaching leaf apex, others basal; reticulate veins abaxially conspicuous. Spikes leaf-opposed. Male spikes 8–16 cm × 2–2.3 mm; peduncle slightly longer than petioles; rachis densely yellowish pubescent; bracts orbicular or suborbicular, 1.2–1.5 mm wide, peltate, ± sessile. Stamens 3; filaments ca. as long as anthers; anthers ovoid. Female spikes to ca. as long as leaf blades; rachis and bracts as in male spikes. Ovary ovoid, distinct, apex acute; stigmas 3 or 4, ovate-lanceolate. Drupe ovoid, 4(–7) mm, apex acute.

Forests, on trees; 1000–1400 m. W Yunnan [Bhutan, E India, Nepal].

58. Piper pleiocarpum C. C. Chang ex Y. C. Tseng, Acta Phytotax. Sin. 17(1): 40. 1979.

线梗胡椒 xian geng hu jiao

Climbers woody, glabrous except for rachis, dioecious. Stems 1–2 mm thick. Petiole 0.6–2 cm; prophylls ca. 1/2 as long as petioles, sometimes longer or shorter; leaf blades toward base of stem ovate, 5–6 × 3.5–4.5 cm, thinly papery, finely glandular, base rounded, ± symmetric, apex acuminate; veins 5–7, apical pair arising 0–7 mm above base, others basal; leaf blades toward apex of stem ovate-lanceolate or narrowly elliptic, 6–9 × 2–3.5 cm, base gradually tapered or cuneate, rarely rounded, usually emarginate, sinus narrower than petiole, apex caudate-acuminate. Spikes leaf-opposed. Male spikes ca. 5 cm × 2 mm; peduncle ca. 4 × as long as petioles of leaves toward apex of stem; bracts ovate, sometimes base slightly tapered, ca. 1 mm wide, peltate, sessile. Stamens 2, large; filaments slightly thicker than anthers; anthers globose. Female spikes subglobose, ca. 1 cm diam. in fruit; peduncle ca. 3.5 × as long as infructescences; bracts suborbicular, otherwise as in male spikes. Stigmas 3 or 4, ovoid. Drupe drying black, globose, ca. 4 mm in diam., partly immersed in rachis. Fl. Oct, fr. May.

• Forests, on trees; 2100–2700 m. SW Yunnan.

59. Piper retrofractum Vahl, Enum. Pl. 1: 314. 1804.

假荜菠 jia bi ba

Chavica officinarum Miquel; *Piper chaba* Hunter; *P. officinarum* (Miquel) C. de Candolle.

Climbers glabrous except for rachis and stigmas, dioecious. Stems brownish when dry, ca. 2 mm thick, terete, striated. Petiole 5–11 mm, sheathed at base only; leaf blade narrowly elliptic, ovate-oblong, or elliptic, 8.5–16 × 3.2–7.5 cm, papery, glaucous when dry, densely glandular, base with both sides rounded or 1 side slightly tapered and short, tapered and short side sometimes concave to semicordate, ± symmetric to oblique, bilateral difference 0–5 mm, apex shortly acuminate to acute; veins 9–11, rarely more, pinnate, usually 4 or 5 on each side of midvein. Spikes leaf-opposed. Male spikes 5–6.5 cm; peduncle slightly longer than petioles; bracts orbicular, 1–1.2 mm wide, peltate, sessile. Stamens 2 or 3; filaments nearly absent; anthers broadly ellipsoid. Female spikes 3–4 cm × ca. 7 mm; peduncle and bracts as in male spikes. Ovary immersed in rachis; stigmas 3, ovate-acute, recurved. Unripe drupe partly connate to rachis, apex rounded. Fl. May–Jul.

?Yunnan; cultivated in Guangdong [India, Indonesia (?Timor), Malaysia, Philippines, Thailand, Vietnam].

Widely cultivated and of uncertain origin. There is a single record of this species (or a closely related one), apparently growing wild in Yunnan. The collection, *C. W. Wang 75415*, differs from the usual cultivated plant by the longer infructescence.

Used medicinally.

60. Piper umbellatum Linnaeus, Sp. Pl. 1: 30. 1753.

大胡椒 da hu jiao

Heckeria subpeltatum (Willdenow) Kunth; *Lepianthes umbellatum* (Linnaeus) Rafinesque; *Piper postelsianum* Maxiowicz; *P. subpeltatum* Willdenow; *P. umbellatum* var. *subpeltatum* (Willdenow) C. de Candolle; *Pothomorphe subpeltata* (Willdenow) Miquel; *P. umbellatum* (Linnaeus) Miquel.

Subshrubs erect, 1–2 m high. Stems thick, strong, striated. Petiole 15–25 cm, glabrous or ± hispidulous; leaf blade ovate or suborbicular, 17–37 × 15–32 cm, membranous, densely brown glandular, glabrous, or hispidulous along veins, base deeply cordate, ± bilaterally symmetric, apex mucronate or obtuse; veins 11–13, apical pair arising 1–2 cm above base, ± opposite, others basal. Flowers bisexual. Spikes (1–)2–7 in umbel-like clusters on short, axillary branches. Spikes 2–7 per umbel, 7–12 cm; peduncle of umbels thicker and longer than those of spikes; bracts triangular,

ca. 1 × 0.5 mm, peltate, stalked, margin ciliate. Anthers much longer than filaments. Drupe obovoid or cuneate-obovoid, 0.7–1 × ca. 0.5 mm, glandular. Fl. Nov.

Wet places within forests; ca. 300 m. C and S Taiwan [Cambodia, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand, Vietnam; Africa, tropical and subtropical North and South America].

This species is sometimes placed in the genus *Pothomorphe* on the basis of the distinctive inflorescence.

3. PEPEROMIA Ruiz & Pavon, Fl. Peruv. Prodr. 8: 8. 1794

草胡椒属 cao hu jiao shu

Herbs annual or, usually perennial, (Chinese species) rooting from nodes toward base of stem and with erect or ascending flowering shoots. Stems usually dwarf, fleshy; vascular bundles free, scattered. Prophylls absent. Leaves alternate, opposite, or whorled, main lateral veins all basal; reticulate veins inconspicuous. Flowers bisexual, very small, often within depressions in rachis, sessile. Inflorescence a spike, usually erect, terminal or axillary, rarely leaf-opposed, solitary, paired, or clustered; rachis as thick or slightly thicker than peduncle; bracts ± orbicular, peltate (sometimes oblong and/or not peltate). Stamens 2; filaments short, thecae ± globose, ellipsoid, or cylindric. Ovary 1-loculed; ovule 1; stigma 1, rarely 2-cleft, globose, apex obtuse or acute, beaked or brushlike, lateral or terminal. Fruit a very small, sticky nutlet, often partly enclosed in pit in rachis, sometimes distinctly curved.

About 1000 species: widely distributed in tropical and subtropical regions; seven species (two endemic, one introduced) in China, mostly growing on trees or moss-covered rocks.

1a. Leaves alternate, base of blade cordate; erect or ascending; annuals ..... 7. *P. pellucida*
1b. Leaves opposite or in whorls of 3–5, base of blade cuneate to rounded; stoloniferous perennials.
2a. Rachis of inflorescence densely pubescent; dried stems deeply sulcate; leaves usually thick and wrinkled when dried ..... 1. *P. tetraphylla*
2b. Rachis of inflorescence glabrous; dried stems flat or irregularly wrinkled; leaves thin and flat when dried.
3a. Leaf apex deeply notched; plants completely glabrous ..... 6. *P. nakaharai*
3b. Leaf apex mostly rounded, rarely shallowly emarginate; stems hairy.
4a. Leaves persistently uniformly pubescent to shortly hispid on both surfaces.
5a. Leaves 1(–3)-veined; petiole 1.5–3 mm ..... 2. *P. cavaleriei*
5b. Leaves 3–5-veined; petiole 5–18 mm ..... 3. *P. blanda*
4b. Leaves glabrous or rapidly glabrescent, or ciliolate only at apex and margin.
6a. Leaves elliptic to oblanceolate, 1(–3)-veined; spikes 1 per flowering shoot, rarely more, less than 2 cm; fruit ellipsoid, curved ..... 4. *P. heyneana*
6b. Leaves obovate, 3-veined; spikes several per flowering stem, 2–4.5 cm; fruit broadly ovoid, straight ..... 5. *P. rubrivenosa*

1. Peperomia tetraphylla (G. Forster) Hooker & Arnott, Bot. Beechey Voy. 97. 1832.

豆瓣绿 dou ban lu

Piper tetraphyllum G. Forster, Prodr. Fl. Ins. Austr. 5: 5. 1786; *Peperomia reflexa* (Linnaeus f.) A. Dietrich (1831), not *P. reflexa* Kunth (1815); *P. reflexa* (Linnaeus f.) A. Dietrich f. *sinensis* C. de Candolle; *P. tetraphylla* var. *sinensis* (C. de Candolle) P. S. Chen & P. C. Zhu; *Piper reflexum* Linnaeus f.

Herbs perennial, fleshy, forming clumps, usually glabrous except for rachis and bases of bracts. Stolons present. Stems many branched, 10–30 cm, internodes thickly ridged. Leaves dense, ± uniform in size; petiole 1–2 mm, glabrous or pubescent; leaf blade broadly elliptic or suborbicular, 0.9–1.2 cm × 5–9 mm, fleshy, pale and usually wrinkled when dried, pellucid dotted, glabrous or sparsely pubescent, rarely densely pubescent, base and apex rounded, slightly revolute; veins 3, slender, usually inconspicuous. Spike terminal and axillary, solitary, 2–4.5 cm; peduncle sparsely pubescent to ± glabrous; bracts suborbicular, stalk short. Filaments short, thecae rounded-“D”-shaped. Ovary ovoid, inserted within excavations of rachis; stigmas capitate, pubescent. Nutlet subovoid, ca. 1 mm. Fl. Feb–Apr, Sep–Dec.

Wet rocks and dead trees, along streams; 600–3100 m. Fujian, S Gansu, Guangdong, Guangxi, Guizhou, Sichuan, Taiwan, S Xizang, Yunnan [Bhutan, India, Indonesia, Malaysia, Philippines, Sikkim, Sri Lanka, Thailand; Africa, Central and South America, Oceania].

Some plants from Guizhou and S Yunnan are much more densely hairy than the typical form of *Peperomia tetraphylla* and can be separated as var. *sinensis*.

Used for medicinal and ornamental purposes.

2. Peperomia cavaleriei C. de Candolle, Nouv. Ann. Mus. Hist. Nat. 3: 41. 1914.

硬毛草胡椒 ying mao cao hu jiao
Herbs 15–30 cm high. Stolons present. Stems fleshy, branched, densely hispid. Petiole 1.5–3 mm, densely hispid; leaf blade broadly elliptic to long obovate, 1.5–2.5 × 1–1.5 cm, papery, glandular, both surfaces hispid, base cuneate, apex rounded; vein(s) 1(–3), usually hidden by hairs. Spikes terminal and axillary, much longer than leaf blades, 3–5 cm, flowers ± dense, sunken into rachis; peduncle 1.1–1.5 cm, sparsely pubescent; bracts suborbicular, ca. 0.5 mm wide, stalk short. Filaments slender; anthers globose. Ovary ellipsoid, dotted, apex ± acute, scabrous. Fl. May–Jul.

• Forests, wet rocks. Guangxi, Guizhou, Yunnan.
This species might prove to be a depauperate form of the widespread and variable *Peperomia blanda*.

3. Peperomia blanda (Jacquin) Kunth, Nov. Gen. Sp. 1: 67. 1816.

石蝉草 shi chan cao
Piper blandum Jacquin, Collectanea 3: 211. 1789; *Peperomia arabica* Decaisne ex Miquel var. *floribunda* Miquel; *P. blanda* var. *floribunda* (Miquel) Hüber; *P. dindygulensis* Miquel; *P. esquirolii* H. Léveillé; *P. fauriei* C. de Candolle; *P. formosana* C. de Candolle; *P. japonica* Makino; *P. laticaulis* C. de Candolle; *P. leptostachya* Hooker & Arnott; *P. leptostachya* f. *cambodiana* C. de Candolle; *P. leptostachya* var. *cambodiana* (C. de Candolle) Merrill; *P. sui* Lin & Lu.
Herbs perennial, usually terrestrial, (10–)20–45(–50) cm high, all parts pubescent. Stolons present, slender, leafless. Stems often very fleshy, often reddish. Petiole (0.5–)1–1.5 cm; leaf blades elliptic-obovate, those at base of stem sometimes suborbicular, abaxially often reddish, 2–4(–6.5) × 1–2(–4) cm, ± membranous when dried, glandular, both surfaces pubescent, base tapered to cuneate, apex rounded to subacute; veins 3(–5). Spikes terminal and from axils of apical leaves, sometimes fascicled, (3.5–)5–8(–12) cm, flowers lax; peduncle 0.5–1.5(–2) cm; rachis 2.5–10 cm × (0.5–)1–2 mm; bracts ± orbicular, ca. 0.8 mm wide, gland dotted. Filaments short, thecae rounded-"D"-shaped. Ovary obovoid, apex obtuse to emarginate. Nutlet sometimes borne on shortly conical false pedicel when fully ripe, globose to broadly ellipsoid, 0.5–0.8(–1.2) mm, obscurely papillate. Fl. Apr–Dec.

Forests, shady, wet rock crevices; 100–1900 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Taiwan, Yunnan [Bangladesh, Cambodia, India, Japan, Malaysia, Myanmar, Sri Lanka, Thailand, N Vietnam; Africa, SW Asia, South America].

A very wide view has been taken of this taxon, which is treated as a pantropical species. The extremes are certainly very distinct: robust, green plants with large whorls of blunt tipped leaves (*"Peperomia japonica"*), contrasting with more slender plants, often with reddish stems and abaxial leaf surfaces, and with pairs of acutely tipped leaves (*"P. dindygulensis"*), but these are connected through intermediates, and it does not seem practicable to separate taxa. A possible exception is the recently described *P. sui*, from Taiwan, which is very clearly differentiated from other collections from that island (which mostly fall comfortably within *P. japonica* sensu stricto) by the minutely papillate abaxial leaf epidermis. This feature is very difficult to see in herbarium material and needs investigating more widely. The "pseudopedicels" (minute, domed swellings of the rachis that raise up the mature fruit), which are supposed to provide a distinction between *P. blanda* and *P. leptostachya* (present in the former, absent in the latter), occur very irregularly throughout the range of this species and are probably of uncertain significance.

Used medicinally.

4. Peperomia heyneana Miquel, Syst. Piperac. 123. 1843.

蒙自草胡椒 meng zi cao hu jiao
Peperomia duclouxii C. de Candolle.
Herbs perennial, forming clumps, 5–15 cm or slightly higher. Stolons present. Stems branched, glabrous or sparsely pubescent. Petiole 1–8 mm, usually glabrous; middle and leaf blades toward base of stem usually small, obovate-oblong or obovate-cuneate, rarely suborbicular, 0.5–1.5 cm × 3–8 mm, membranous, dotted, both surfaces glabrous or finely pubescent when young, glabrescent, base cuneate, apex rounded or emarginate, rarely with ciliolate sinus; veins 1 or 3. Spikes terminal, rarely axillary, usually solitary, rarely fascicled, 1–4.5 cm; peduncle 0.5–1.5 cm; rachis glabrous, 1–2 mm thick; bracts ± orbicular, ca. 0.5 mm wide, stalk short. Filaments slightly longer than anthers; anthers ± globose. Ovary ovoid, oblique, very small, papillate-pilose; stigmas glabrous. Nutlet ovoid to ovoid-oblong, ca. 0.8 × 0.4 mm. Fl. Apr–Oct.
Forests, ravines, wet, moss-covered rocks; 800–2000 m. W Guangxi, Guizhou, S Sichuan, Xizang, Yunnan [Bhutan, India, Myanmar, Nepal, Sikkim].

5. Peperomia rubrivenosa C. de Candolle, Philipp. J. Sci., C. 5: 409. 1910.

兰屿椒草 lan yu jiao cao
Peperomia kotoensis Yamamoto.
Herbs perennial, 3–9 cm high, most parts sparsely pilose. Stems with a few hairs. Petiole 3–9 mm; leaf blade obovate, orbicular, ovate-rhombic, or ovate, 1.2–2.5 × 1.2–1.5 cm, papery, base cuneate to rounded, apex rounded, margin sparsely hairy when young; veins 3. Spikes both terminal and from axils of apical leaves, sometimes up to 3 together, several per flowering shoot, to ca. 4 cm × 1 mm; peduncle to 1.1 cm; rachis to 3 cm; flowers sparse; bracts orbicular, ca. 0.5 mm wide. Filaments very short; anthers orbicular. Nutlet broadly ovoid, ca. 0.6 × 0.4 mm.

Wet, evergreen forests, on moss-covered rocks and trees; 300–400 m. Taiwan (Lan Yu opposite SE coast) [Philippines].

6. Peperomia nakaharai Hayata, J. Coll. Sci. Imp. Univ. Tokyo 25: 188. 1908.

山椒草 shan jiao cao
Herbs perennial, ca. 9 cm high, glabrous throughout. Stolons present. Stems prostrate, with many ascending branchlets. Petiole 0.5–3 mm; leaf blade obovate-cuneate, 3–11 × 2–6 mm, ± membranous, abaxially glaucous, base cuneate to rounded, apex deeply notched;

vein 1. Spikes terminal, ca. 1.5 cm; rachis 0.5–2 cm; bracts gland dotted. Ovary sessile, ovoid. Nutlet ca. 0.5 mm. Fl. Jun–Nov.

- Forests; 700–2500 m. SC Taiwan.

7. Peperomia pellucida (Linnaeus) Kunth, Nov. Gen. Sp. 1: 64. 1816.
草胡椒 cao hu jiao
Piper pellucidum Linnaeus, Sp. Pl. 1: 30. 1753.
Herbs annual, fleshy, 20–40 cm high, all parts glabrous. Stems erect or ascending, branched, glabrous. Petiole 1–2 cm; leaf blade broadly ovate or ovate-triangular, length ± equal to width, 1–3.5 cm, membranous, both surfaces glabrous, translucent, base cordate, apex acute or obtuse; veins 5–7. Spikes terminal or leaf-opposed, slender, 2–6 cm, glabrous, flowers lax; bracts suborbicular, ca. 0.5 mm wide, stalk short. Anthers subglobose. Ovary ellipsoid; stigmas pubescent. Nutlet globose, ca. 0.5 mm in diam. Fl. Apr–Jul.

Wet places within forests, rock crevices, bases of cliffs, sometimes a weed of cultivation; near sea level to 200 m. Fujian, Guangdong, Guangxi, Hainan, Yunnan [native to tropical North and South America].